



First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

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Flight

and The Aircraft Engineer

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also remains a separate and independent force, its relations with the Army and Navy continuing unaltered. The Air Ministry, it continues, is proceeding, in general accordance with the recommendations of the Civil Aerial Transport Committee, to carry into effect legislation and international agreements required to enable civil aviation to be begun again as soon as possible. To provide for the needs of civil aviation as well as for those of the R.A.F., reorganisation of the Air Ministry is necessary, and it is being prepared. Meanwhile, the following arrangements will be made: The Orders in Council constituting the Air Council will be amended so as to provide that the Parliamentary Under-Secretary of State, who is *ex officio* Vice-President of the Air Council, will be charged with responsibility to the Secretary of State for all the business of the Air Council under the general direction of the Secretary of State. The responsibility hitherto placed on the Parliamentary Under-Secretary of State for the finance, contracts, and lands business of the R.A.F. will be transferred to Lord Londonderry, who will be appointed an additional member of the Air Council, and, at the request of Lord Curzon, will represent the Air Ministry in the House of Lords.

We admit we may be dense, but we really cannot reconcile these statements one with another. The Air Ministry is to remain separate and independent, yet it is to be "under the general direction" of the Secretary of State for War! As *The Times* very aptly puts it in a leading article, Mr. Churchill is not to impose the will of the War Office on the Air Ministry, but is rather to act as *liaison* officer between the two! But why, we should like to know? Surely, if *liaison* is necessary—and we are quite prepared to admit that it is—it would be easier and far less likely to raise suspicion in the public mind for an officer of less rank than a first-class Cabinet Minister to assume the duties. It would be quite enough to cover the essentials by giving a seat on the Air Council to a member of the Imperial General Staff or of the Army Council, who would sit in an advisory capacity to keep the Air Council abreast of the needs and ideas of the army. Again, why should it be necessary to alter the Orders in Council if the Air Ministry and the R.A.F. are really to remain separate and to maintain their independence? The Orders in Council were well thought out, and appear to cover all the ground necessary if it is the real

EDITORIAL COMMENT



It is more than a little interesting to see how the note of alarm first sounded by "FLIGHT" in consequence of the numberless rumours as to the intentions of the Government towards the Air Ministry and the R.A.F. has developed into a veritable crescendo of criticism of the creation of a dual office of Secretary for War and the Air. Almost all the great dailies have gone tooth and nail for the action of the Prime Minister, and their criticisms have been based on the exact premises upon which we took our initial stand. The result of it all has been that the Government has felt itself bound to make some sort of explanation, which has been done through the medium of a *communiqué* by the Secretary to the Air Ministry, stating that the status of that Ministry is in no way changed. It remains, according to this statement, a completely separate and independent Ministry, the sole connection with the War Office being that one Secretary of State controls both Departments. The R.A.F.

The Air Ministry Muddle

intention to leave well alone. It seems to us that the mere fact that an Under-Secretary of State is, under the amended Orders, to perform the functions of an Air Minister necessarily connotes a change in status which cannot be camouflaged by any form of official denial so long as the new ideas are persisted in. At the present moment—or until the names of the new Cabinet were announced—the Air Minister ranks as a first-class Secretary of State, responsible only to the Cabinet as a whole and to Parliament in his own proper person. For the future, the Air Minister is to occupy a nebulous sort of position, apparently responsible to no-one for his Department, with a somewhat glorified Under-Secretary to act as a buffer between the Minister and the public. It seems pertinent in the circumstances to ask if the War Office is to be reorganised on the same basis, and if Mr. Churchill is to be placed in the same happy position of semi-responsibility as he apparently occupies at the Air Ministry? Clearly, if it is a desirable arrangement in the case of the one, it should certainly be equally so in the other. We confess we do not understand the position at all, except from the point of view that the official *dementi* we have quoted is meant, not to explain the intentions of the Government but to conceal them.

#### A Retrograde Step

The action taken by the Prime Minister takes us back to the state of muddle and confusion from which the Air Services emerged at the end of 1917, when the R.A.F. was created and the Air Board changed its status to that of a Ministry. It is inexplicable except from two standpoints. Either the reactionaries of the Admiralty and the War Office have “nobbled” the Premier and are in a fair way to regain control of the Air Service, or the duality of office is consequent upon the admitted difficulty of fitting in the *personnel* of the new Cabinet. We have seen the latter given as the more probable reason, but we cannot agree. If it were merely a question of picking the men for the jobs, it would surely have suggested itself to someone that Mr. Churchill should have succeeded Lord Weir at the Air Ministry and that General Seely should have gone back to his old post as Secretary of State for War. Alternatively, if the latter is really a big enough man to carry a great Department of State, he might have been given actual rank at the Air Ministry instead of being put there as a mere appanage of Mr. Churchill. Therefore, the difficulty of fitting in the new *personnel* will not do as an explanation of an extraordinary situation.

Our own opinion, for what it may be worth, is that the rabid reactionaries are, as we know, fighting desperately to get the Air Service back to the control of the Admiralty and the War Office. Mr. Lloyd George, with the lessons of the War still fresh in mind, has not been able to arrive at a concrete decision in the matter, torn as he has been between the reactionary influences on the one hand and his own better judgment on the other, and has made the present appointment in order to tide over in the meantime and in the hope that matters will more or less settle themselves. Indeed, it has been hinted in official quarters that the dual arrangement is only a temporary one, and it has been defended on that score. But why tinker with temporary appointments and arrangements in one of the most vital offices of the recon-

struction period? If temporary arrangements are necessary in the Government, there are half-a-dozen directions in which a hand-to-mouth policy would do no particular harm in the meantime, but there are others—and the Air Ministry is one—in which appointments should have as much of an air of finality as is possible.

The R.A.F., formed a bare twelvemonth ago by the fusion of the Naval and Military air services, has cut its teeth. It is just getting past the dangerous age, and if it is handled properly and with a due sense of responsibility now it will come through and prove that it has an enormous future of usefulness. If, on the other hand, it is made the sport of politicians and reactionary admirals and generals, the admirable *esprit de corps* that has been created during the War will crumble. The position to-day is exceedingly bad for the *morale* of the Force. Everything is uncertain—neither officers nor men know what the future is likely to hold for them, and when they see the Service being played with as it is, it is no wonder that many who had intended to make the R.A.F. their life's profession are strongly minded to get back to civilian life as soon as may be and take their chances in business or commercial life rather than to find themselves thrown on the world a little later on. No one can blame them for this outlook on the matter, which is entirely due to the utter uncertainty as to what is going to happen in the near future.

#### A Ministry of Defence

The whole consensus of opinion seems to be in favour of leaving the position where it was before the re-shuffle of the Cabinet cards. That is to say, all opinion is for a separate Air Ministry and a separate Flying Service, divorced from all control by or association with either of the other fighting services so far as the main lines of administration and independence of command are concerned. That is the doctrine we have consistently upheld all along, since long before the R.A.F. became a separate Service. The suggestion has been seriously made in responsible quarters that the time is ripe for the formation of a Ministry of Defence, under which all three fighting services should be grouped, with a Minister responsible to Parliament for the readiness and efficiency of all three, the latter each to be actively administered by an Under-Secretary responsible to the Minister of Defence. Under such a scheme the three Services would remain separate, with civilian aviation in much the same relation to the R.A.F. as the mercantile marine bears to the Royal Navy. So far as the basic idea is concerned, there does not seem to be any great objection to it. There is just this, however, to be said: that the defensive arrangements of the British Empire are of necessity of so stupendous a character that it may well be found after a strict examination of the project that they cannot be properly co-ordinated under a single head. Centralisation may be a good thing up to a point, but when that point has been passed it brings certain evils in its train that completely negate its other manifest advantages. We believe we are right in saying that no first-class Power has ever seriously considered placing the whole of its naval and military affairs under a Ministry of Defence. The idea works very well in the case of the self-governing Dominions, but it must be pointed out that their forces are relatively small. Their armies are quite small, while the same





Major-General Sir F. H. SYKES, K.C.B., C.M.G., Chief of the Air Staff.

is even more true of their naval forces where the latter exist at all, and it scarcely seems to follow that an arrangement which might be excellent in the case of a small Power would be equally good in that of the British Empire. In fact, such a proposition is so tentative at the moment that we should not have troubled to discuss it at all were it not for the appointment we have adversely criticised. Mr. Churchill is an ambitious politician, and we are rather given to wonder if he has managed to get himself into control of two out of the three Services with an eye to the recasting of the whole administrative scheme of defence on the lines suggested. We are not at all certain that we should view it with complete disfavour if it were so, provided the scheme were well thought out and approved by the best naval, military and aerial advisers of the Crown. It would not be the same thing as tying the aerial arm to the chariot of the War Office, as seems to be the intention now. It is an idea that the public can understand, whereas the present position is one that nobody can either understand or appreciate. Certainly more will have to be forthcoming in the way of explanation than the very lame document issued by the Air Ministry, which really explains nothing and leaves us as suspicious as ever of the ultimate intentions of the Government.

#### Government Control of Civilian Aviation

Some few weeks ago we referred to Lord Weir's remarks on the subject of the training of pilots for civilian purposes, and attacked the dictum that it was the business of the State to undertake all training, whether for the R.A.F. or for civilian work. General Brancker has now followed suit, and told an audience the other day that his opinion was that in future pilots will be trained at Government institutions, will wear uniform, and will be required to hold Government certificates. Will they, indeed? We are certainly in agreement with one of the gallant general's articles of faith, but only one. The Government certificate is an excellent, even a necessary, provision, since the public, whether it elects to actively use aerial services or whether it prefers to go about its lawful occasions on the ground, will certainly ask that those who are entrusted with the navigation of aircraft shall be proved fit to be in charge and so certified by a responsible authority. That authority must necessarily be a Government department, since no other examining and licensing authority would adequately fill the requirements of the public ease of mind. Therefore, we are content to take the licensing of pilots by the State as being read and agreed, but when we come to the consideration of the other two points—the training in Government institutions and the wearing of uniform—we are in total disagreement. We are very much afraid that General Brancker and those who think with him fail to appreciate the public sentiment in these matters. During the War, the people were content to watch the growth of bureaucratic institutions, and to see more and more of their liberties taken from them and civilian activities placed under Government control, because they recognised that it was all a part of the sacrifice to victory. Unfortunately the mind of the typical bureaucrat runs in a groove, and is quite incapable of appreciating that there is a great revulsion of feeling and opinion coming. It is not at all in derogation of our soldiers we say that the whole country is sick to death of

seeing and wearing uniform. The British are not a uniform-loving people, and the wearing of it has been another sacrifice to the exigencies of war, and all they want now is to get out of it and see as little as possible of it in the future. If any Government department thinks it is going to compel civilians to wear any sort of uniform after the War is finished and done with, it is making a capital mistake. We are certainly not going to imitate Germany of *ante*-1914, in which nearly everybody wore uniform.

Then, as to the suppression of civilian flying schools—for that is really what is connoted by Lord Weir and General Brancker when they speak of all pilots being trained in Government institutions—we can say again that the country is not likely to tolerate anything of the sort. We have had quite enough Government control of our several businesses and occupations, and we have submitted to it as the only means of winning the War, and for that reason only. For the future, there has got to be as little interference with people's private concerns as there has been much during the past four years. In the specific matter of civilian flying schools, these are legitimate private enterprises created before the War, and at that time sealed with the seal of official approval. In what way has the position altered now that the Government seems so anxious to suppress them and filch the livelihood from the people to whom they belong? Are they likely to be less efficiently conducted than they were in 1914, when there was infinitely more chance of serious accident than there is to-day? Or are the people behind them any less honest in their dealing than they were? Or is it not really the case that the more "control" can be exercised, and the more businesses the State can keep its fingers in, the more jobs there will be for the "temporaries" of the new bureaucracy?

If we could see the necessity of State training as well as of State licensing, we should be the first to say so, although it would be hard luck on those who look to these schools as a business or profession, but we see no more reason for a State monopoly than there is for a similar monopoly of training for the mercantile marine. By all means let the Air Ministry make all provision for the training of pilots and observers for the R.A.F., as the Navy does for training its own officers, but the training of civilian pilots is civilian business, and must be left at that.

Agreed that in certain directions there must be a measure of Government control. Aviation being a vital part of the programme of future development, the State will have to actively interest itself, and as its scope is far too wide and far-reaching to be covered by private enterprise, we shall have to look to the State for a large amount of encouragement and assistance. Private enterprise cannot develop the meteorological and wireless services that will be essential to the safety of aerial navigation, any more than it could have undertaken the lighting of the coasts of the world in the interests of marine navigation; nor, to pursue the analogy, could the world's harbours and ports have been constructed and maintained privately by the shipowners. Commercial aviation is absolutely on all-fours with maritime commerce in these matters, and, as the State has not actively interfered in its development, there is no more reason for such interference with aviation. The State examines masters and officers for their fitness to navigate the seas, but it does not train



them. It lays down rules for safety of construction and navigation, but it does not go farther. Keep State control of aviation within the same reasonable bounds, and we shall make progress.

If the bureaucrats get their way, there will be stagnation all round owing to want of competition and the consequent absence of the spirit of emulation. As a matter of fact, when we get down to bed-rock, the Government departments connected with aerial development have not a great deal to be proud of in their war record in so far as concerns progress. We owe our paramount position in aircraft design and in productive capacity almost entirely to the private firms and individual constructors who have worked out their own plans and ideas without direct aid from the Government. Machines of Government design have played a very minor part in the War, while in the matter of engine development the same story is equally applicable. That being so, it is illogical, to say the very least, that the Government should now seek to take entire and detailed control of a business in whose development it has had but a small

part and which the bureaucratic mind is absolutely incapable of carrying any farther along the road of progress.

**The  
Chevrons  
Question  
Settled**

With regard to certain articles that have appeared in previous issues of "FLIGHT," in criticism of the Air Ministry's action in forbidding the wearing of active service chevrons, we are glad to know that our protests have apparently carried weight in official quarters. It has now been decided that these chevrons may be worn on blue uniform. The 1914 chevron is to be green, and those for overseas service in subsequent years black. By its decision to rescind an order that was utterly unjust and a breach of faith with those who have qualified by service for the wearing of chevrons, the Air Ministry has done the right thing, and will allay a great deal of justifiable discontent. For our own part, we are pleased to think that we have been able to exert our influence for the righting of what was unquestionably a wrong to a large number of officers and men of the R.A.F.

**What is Wrong with the W.R.A.F.?**

IN our article on the W.R.A.F. last week we made use of the expression, when discussing the case of the Hon. Miss Douglas-Pennant: "Why the sudden *volle face* alleged to have been performed by Lord Weir and Sir Godfrey Paine, who first of all refused to entertain Miss Douglas-Pennant's resignation of her post, and then, a few days later, seem to have collaborated in her dismissal?"

This is less than fair to Sir Godfrey Paine, and we sincerely regret that we should have inadvertently coupled his name with the actual dismissal of the late Commandant. During the few days that elapsed between the refusal to accept her resignation and her dismissal, Sir Godfrey Paine had been succeeded as Master-General of Personnel by General Brancker, and thus had nothing to do with Miss Douglas-Pennant's dismissal.



Major-General the Right Hon. J. E. B. Seely, C.B., C.M.G., D.S.O., M.P., Under-Secretary of State for Air, and Vice-President of the Air Council to preside over the Council.



The Marquess of Londonderry, who has been appointed an additional member of the Air Council, in charge of finance, contracts and lands business of the R.A.F., and to represent the Air Ministry in the House of Lords.

## "MILESTONES"

### THE "BRISTOL" MACHINES

As one of the pioneer firms in the aircraft industry particular interest attaches to the products of the British and Colonial Aeroplane Co., Ltd., of Filton, Bristol, who commenced their career quite in the earliest days with "box kites" of the Farman type, later followed by more original designs by,

deeper in front, and the cowl is slightly different, but otherwise the machine remains true to its prototype. Unlike several other makes of single-seater tractors, the Bristol has its wing bracing wires arranged in the plane of the staggered struts, a feature that has been considered undesirable on



The Bristol Scout, Type D.

in succession, Prier, Gordon England, and Coanda. It was, however, to neither of these designers that the honour of designing the "Bristol" War machines fell. This responsibility rested upon Capt. F. S. Barnwell, R.A.F., who joined the firm as designer before the War, and produced, in collaboration, we believe, with Mr. Busteed, the little Bristol scout of pre-War days. The first of these machines was exhibited at the Olympia Aero Show of 1914, scale drawings of which were published in "FLIGHT" of April 25, 1914. Later in the year a similar machine was flown by Lord Carberry in the London-Paris-London race. The first Bristol scout was not greatly different from the type D scout illustrated herewith, although there are certain variations as regards dimensions, etc.

#### The Bristol Scout, Type D.

The original Bristol scout had an area of only 156 sq. ft., whereas the type D shown in the accompanying illustrations has a total wing area of 200 sq. ft. In general outline the type D is very similar to the original Bristol scout, the rudder, tail plane and fins, as well as the body and main planes, being of almost identical shape. The body is somewhat

account of the extra drag stress it may impose on the internal bracing of the top plane, but in the case of the Bristol any such tendency is countered by fitting external drag wires running from the upper and lower ends of the rear inter-plane struts to the front of the fuselage. That this form of bracing is adequate would appear to be proved by the fact that to the best of our knowledge no Bristol scout has ever shed its wings in the air. Several variations of the Bristol type D have been built. With the exception of the fitting of different engines and minor alterations, they have not, however, been greatly different from the machine illustrated. To mention only one, there was the 110 h.p. Clerget-engined machine, which had a slightly different cowl, and had a rotating "spinner" fitted over the propeller boss. Unfortunately we have not received any particulars of the performance, etc., of this machine, and so are unable to include it in the accompanying tables.

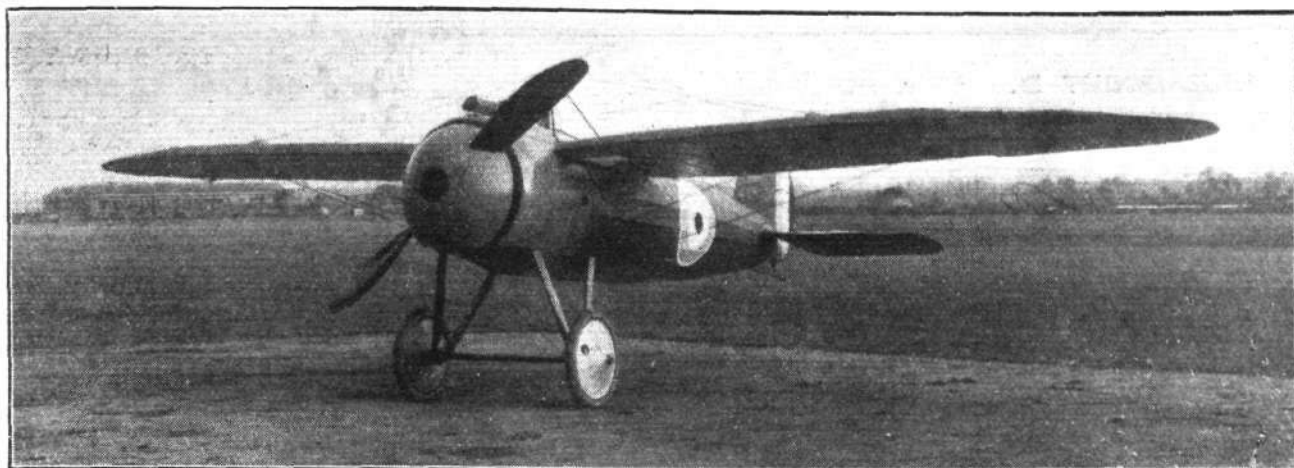
#### The Bristol Scout, Type F

The development of the type D scout takes the form of a single-seater tractor, designed for a much more powerful engine than was the type D. In connection with the type F



The Bristol Scout, Type F.—The engine is a radial, air-cooled, "Mercury."





The Bristol monoplane.

it should be pointed out that whereas the general arrangement drawings and the particulars in the two tables refer to a machine fitted with a 200 h.p. Sunbeam "Arab" engine, the photograph shows a slightly different arrangement, in which the nose of the machine is of different shape, owing to the fact that the engine is a radial air cooled, the Cosmos Mercury engine. In addition to the fact that it is fitted with a different engine, the type F Bristol scout shows variations in nearly all its other component parts, having, in fact, practically no resemblance to the original Bristol scout. Thus it will be seen that the type F has its lower plane of smaller chord and span than the top plane. The wing tips also are of different shape, while the various tail members are totally different in shape. Owing to the deeper nose and generally speaking greater side area in front, a fixed vertical fin is fitted in front of the rudder. The wing bracing is characterised by centre section and inter-plane struts of N formation, and the dihedral angle has disappeared. An examination of the accompanying table of performance, etc., is instructive. It will be seen that while the type D had a wing loading of 6.25 lbs./sq. ft. and a loading of 14.7 lbs./h.p., the corresponding figures for the type F are 8.08 and 10 respectively. The speed near the ground is 100 m.p.h. and 138 m.p.h. respectively, while the climb to 10,000 ft. occupies 18.5 mins. in the case of type D, and only 8.5 mins. for the type F. It is thus seen that it would appear that "performance" is far more a question of load per h.p. than it is one of wing loading, and that it is in fact only the question of a reasonably low landing speed which prevents one from employing a much higher wing loading than is generally found.

#### The Bristol Monoplane

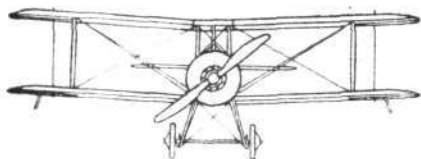
With the exception of the very earliest days of the War, there has been, at any rate in this country, a remarkable absence of aeroplanes of the monoplane type. Some of the first machines to go out were, it is true, of this type, as for instance the Bleriot and Moranes, but before many months of War had passed the biplanes were rapidly supplanting the monoplanes, and during the last two years of War the monoplane was hardly if ever seen. This may appear some-

what strange, especially as the monoplane has undoubted advantages for fighting purposes, giving as it does a much better view forward and upward. Especially is this true of the "parasol" type of monoplane in which the wings are on a level with the eyes of the pilot, but for some reason or other the type has not found general favour. Special interest, therefore, attaches to such few monoplanes as have been built during the war, among which is the Bristol monoplane. This machine, it will be seen from the accompanying illustrations, is of very pleasing appearance, with its streamline body and crescent-shaped wings. Efficiency is the keynote of its design, with head resistance reduced to a minimum. Thus the wing section employed is such as to allow of very deep wing spars which are capable of taking care of their load with a minimum of external aid, in the shape of one wire to each spar. Lateral control is not by means of wing warping, as was the general practice in monoplanes before the War, but by *ailerons* as in the biplanes. This form of lateral control is probably chosen in view of the deep wing section, which would tend to make a comparatively rigid wing structure difficult to warp and liable to excessive strain if warping were employed. In order to give the pilot a better view downwards—forward and upward is already as good as it is possible to make it—openings are provided in the inner portion of the wings, near the sides of the fuselage, and one is inclined to think that in this respect at least the Bristol monoplane is able to hold its own against any conceivable biplane combination. As regards performance: from the table it will be seen that near the ground the monoplane is capable of a speed of 130 m.p.h., which is distinctly good for an engine of only 110 h.p. At 10,000 ft. this speed has dropped to 117 m.p.h., which is not bad considering that the engine is a rotary. The climb also is quite good, the first 5,000 ft. only taking 3½ mins., while 10,000 ft. is reached in 9 mins. As the landing speed is certainly not unduly high, it appears that taking it all round, the monoplane is able to hold its own against the biplane for performance, and there can be no doubt that as regards visibility the mono. has it all its own way. As a matter of fact, had the War continued it is not in the least improbable that this

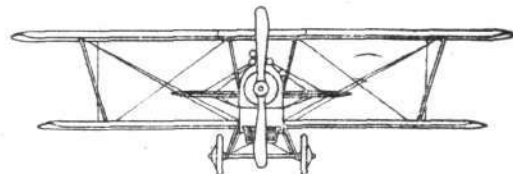


The Bristol fighter, F2 B.

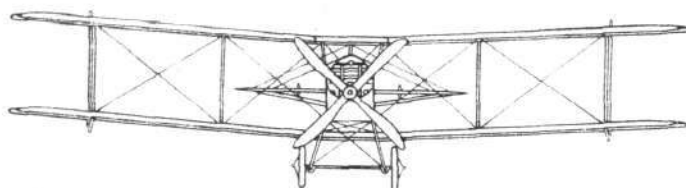
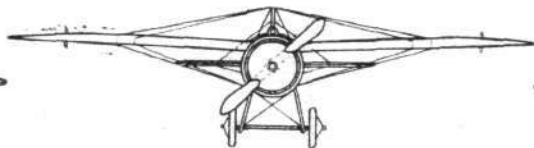
BRISTOL SCOUT D.



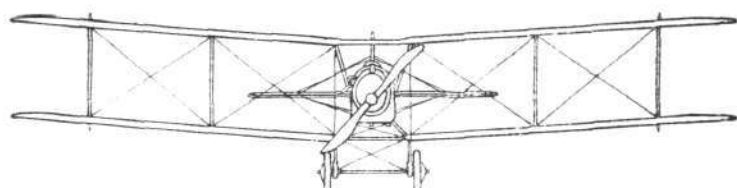
BRISTOL SCOUT F.



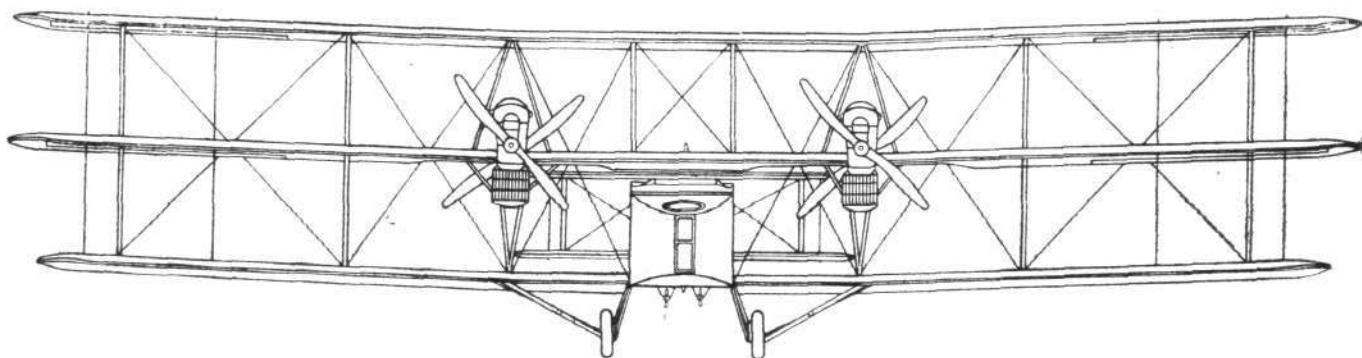
BRISTOL MONOPLANE



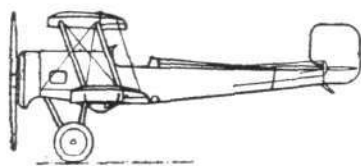
BRISTOL FIGHTER. F.2B.



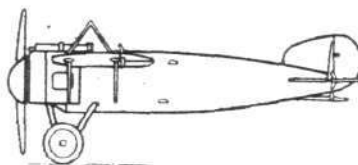
BRISTOL ALL-METAL. M.R.I.



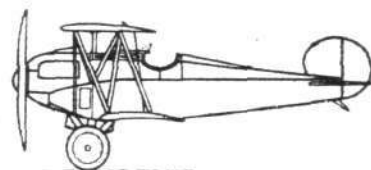
BRISTOL BOMBER



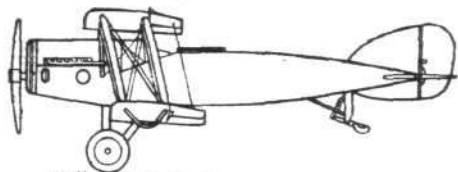
BRISTOL SCOUT D.



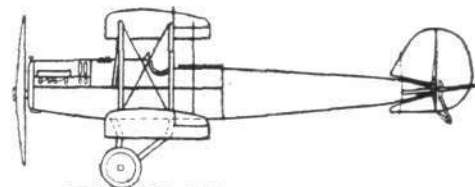
BRISTOL MONOPLANE



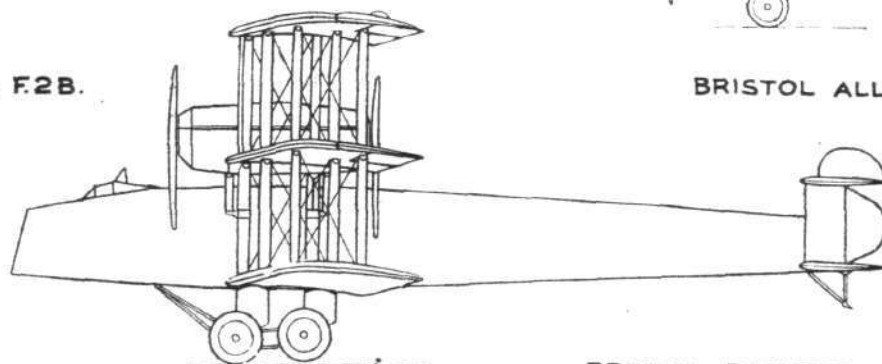
BRISTOL SCOUT F



BRISTOL FIGHTER. F.2B.



BRISTOL ALL-METAL. M.R.I.



BRISTOL BOMBER

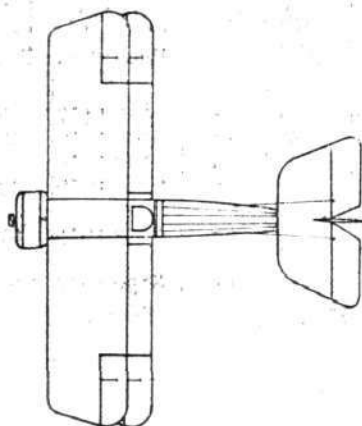
SCALE OF FEET  
0 1 2 3 4 5 6 7 8 9 10 11 12

FRONT AND SIDE ELEVATIONS OF THE BRISTOL MACHINES.—These are all drawn to a uniform scale, the scale being the same as that of the D.H. Milestones, published on January 9.

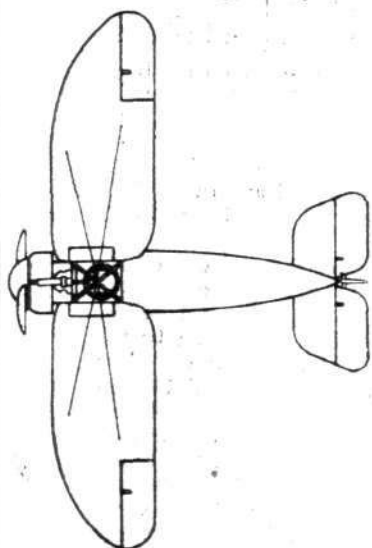
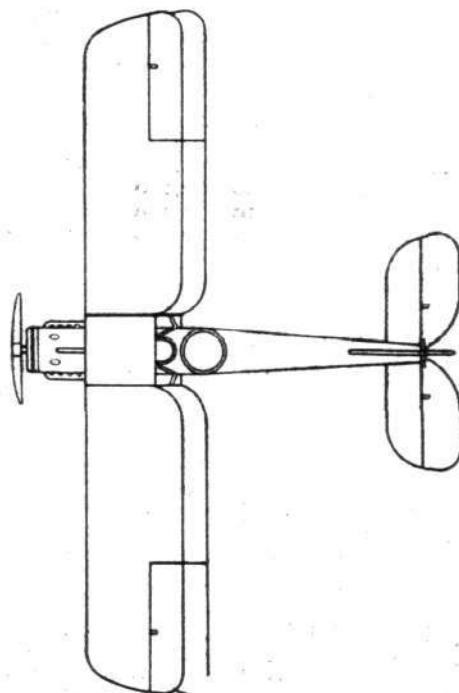
"Flight" Copyright.



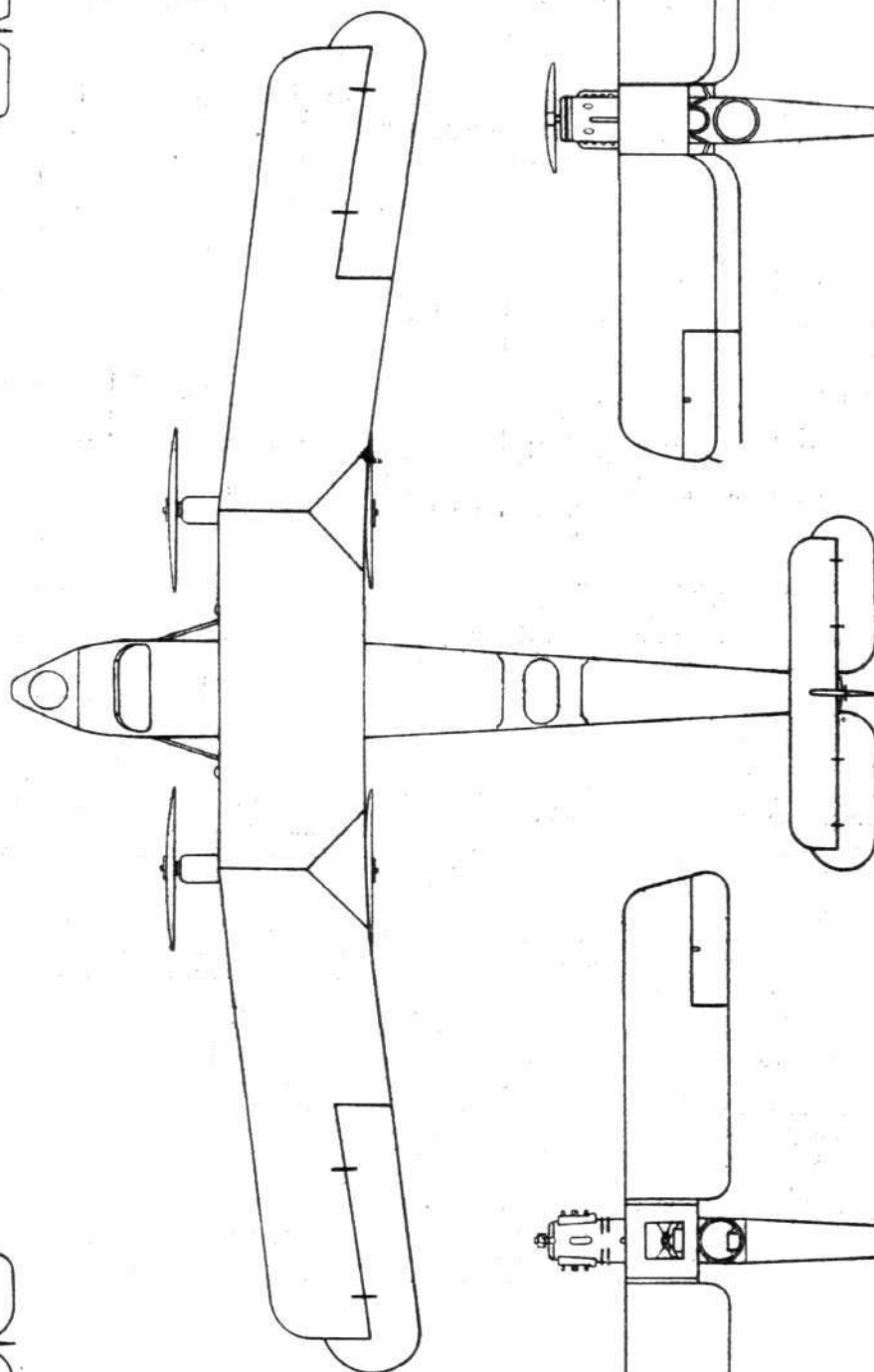
BRISTOL SCOUT D.



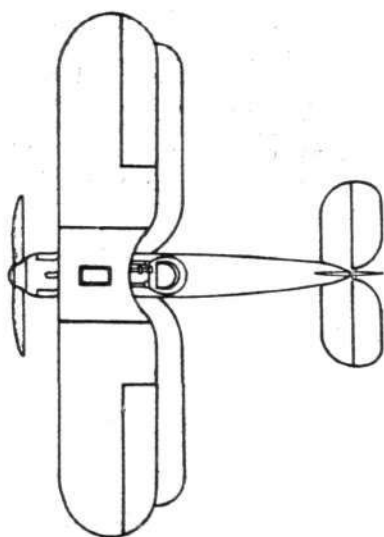
BRISTOL FIGHTER F.2B.



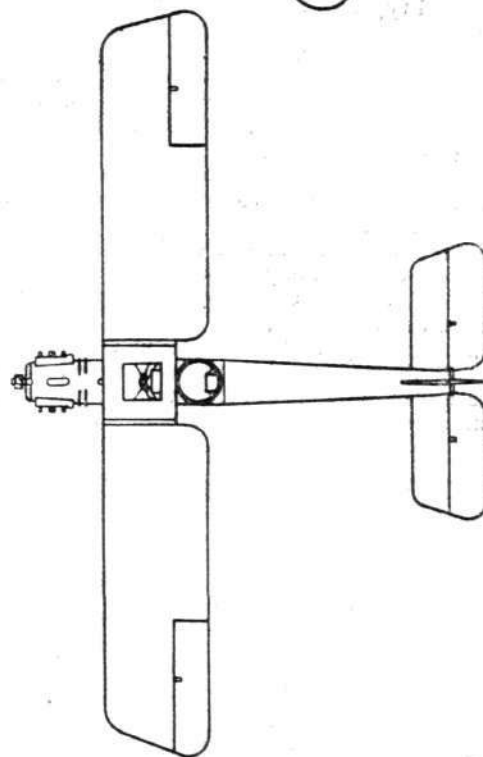
BRISTOL MONOPLANE



BRISTOL BOMBER



BRISTOL SCOUT F.



BRISTOL ALL-METAL M.R.I.

SCALE OF FEET  
0 1 2 3 4 5 6 7 8 9 10 11 12

PLAN VIEWS OF THE BRISTOL MACHINES.—The scale to which these are drawn is the same as that of the D.H. machines previously published.

Table of weights, etc., and performance of "Bristol" machines.

Type of machine.	Engine.		Weight of machine (loaded). lbs.	Fuel capacity (gallons).		Range (in miles).	Speed (m.p.h.).			Climb (in mins.) to		Ceiling. ft.	Stalling speed. m.p.h.	Landing speed. m.p.h.	Load/sq. ft. lbs.	Load/h.p. lbs.	Military load. lbs.
	Type.	H.P.		Petrol.	Oil		Near ground	10,000	15,000	10,000	15,000						
Scout D ..	Le Rh.	80	1,250	27	5½		100	86		18.5				44	6.25	14.7	60
Scout F ..	S.A.	200	2,100	32	5		138	128		8.5	16.0			49	8.08	10.0	270
Monoplane	Le Rh.	110	1,300	20	5		130	117		9.0	19.0			49	8.97	10.8	80
Fighter	R.R.	264	2,800	45	4		125	113		11.5	21.5			48	6.92	10.6	270
F2B.																	
"All-Metal"	H.S.	170	2,810	50	5		110	98		20				47	6.13	16.5	270
Bomber ..	4S.D.	250	16,200	400	40		106	93		35				55	8.50	16.2	2,960

Le Rh. = Le Rhone. S.A. = Sunbeam "Arab." R.R. = Rolls-Royce. H.S. = Hispano-Suiza.  
S.D. = Siddeley-Deasy ("Puma").

Table of dimensions of "Bristol" machines.

Type of machine.	Length o.a.	Wing span.		Wing chord.		Wing area.*			Inci-dence.		Gap.	Stagger.	Sweepback.	Dihedral.		Aileron area.	Area.			Area.		
		Top.	Bot.	Top.	Bot.	Top.	Bot.	Total.	Top.	Bot.				Top.	Bot.		Tail-plane.	Elevators.	Total.	Fin.	Rudder.	Total.
Scout D ..	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	square feet			°	°	ft. in.	ft. in.	°	°	°	sq. ft.	square feet.			square feet.		
Scout F ..	20 8	24 7	24 7	4 6	4 6	103.5	96.5	200	2½	2½	4 3	1 9	0	3½	3½	23.5	23	15	38	0	7	7
Monoplane	20 10	29 6	26 2	5 7	4 11	150	110	260	1	1	5 1	2 1	0	0	0	30.5	15	14.5	29.5	4.1	5.3	9.4
Fighter, F2B.	20 4	30 9	..	5 11	..	145	..	145	0	..	..	..	0	2	..	18	20	15	35	5	4.5	9.5
All-metal.	25 9	39 3	39 3	5 6	5 6	202.5	202.5	405	1½	1½	5 5	1 5	0	3½	3½	50	22.2	23.2	45.4	10.7	7.2	17.9
Triplane†	27 0	42 2	42 2	6 0	6 0	235	223	458	0	0	5 11	0	0	3½	3½	59	27.8	30.0	57.8	7.8	8.25	16.05
	51 6	81 8	78 3	8 6	8 6	650	605	1,905	2½	2½	7 2½	0	6½	2	2	192	96.5	85.0	181.5	28.2	25	53.2

\* Including ailerons. † Centre plane: Span 81 feet 8 ins., chord 8 feet 6 ins., area 650 sq. ft.

type of machine might have reconquered some of the prestige it appears to have lost, and in France at any rate there was not lacking indications to this effect, although this may not be common knowledge on this side of the Channel. For peaceful purposes we are not at all certain that the last has been heard of the monoplane type of machine.

## The Bristol Fighter

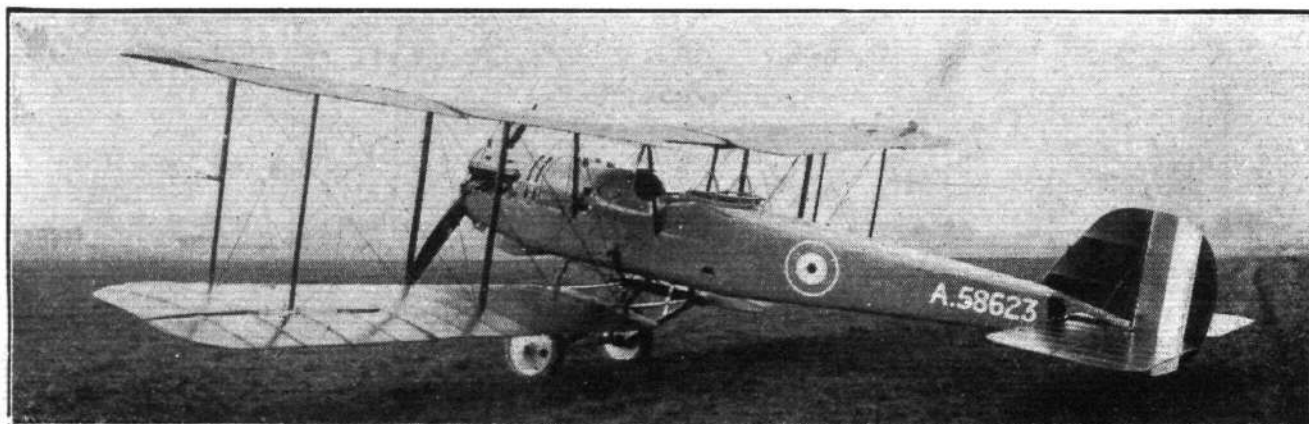
Probably the best known of the Bristol products during the War is the Fighter (F2B). This machine has been extensively used for fighting, reconnaissance, etc., and will be more familiar to readers of "FLIGHT" than, probably, any of the other Bristol types. The impression one receives on examining the F2B is that it was designed in the first instance for the purpose for which it was intended, and not merely designed from the aero-dynamical point of view and afterwards rigged up for certain purposes, for which machines happened to be required. There is a decided difference between the two methods. Thus it will be observed that the designer quite evidently had in his mind to provide as free a field aft as possible, and to this end he chose to flatten the fuselage out to a horizontal knives edge, bringing the various tail members down lower out of the way of the gun. Also the flat top of the body bears evidence of this intention. Again, it was desired to place the gunner and pilot high in relation to the top plane, and to do this would have meant, with the ordinary arrangement, a very deep body with consequent large maximum cross-sectional area. To avoid this the lower plane is not attached to the body, but runs right underneath and some distance below the bottom of the

fuselage. This arrangement has resulted in a somewhat more complicated undercarriage attachment, but everything considered, there is little doubt that it has been worth while.

From the table it will be seen that the performance of the F2B with Rolls-Royce "Falcon" engine is very good indeed. A feature of this machine which will not be found in the table and which cannot be put in table form owing to the absence of any standard of comparison, is the excellent stability of this machine. We are informed by pilots that although she is not in the least sluggish on the controls the Bristol Fighter is endowed with a remarkable amount of inherent stability, which renders her particularly easy to fly. It would, therefore, appear that Capt. Barnwell has managed to find the solution to the problem of good stability combined with ease of control, a fact which should be extremely valuable for post-war aeroplanes.

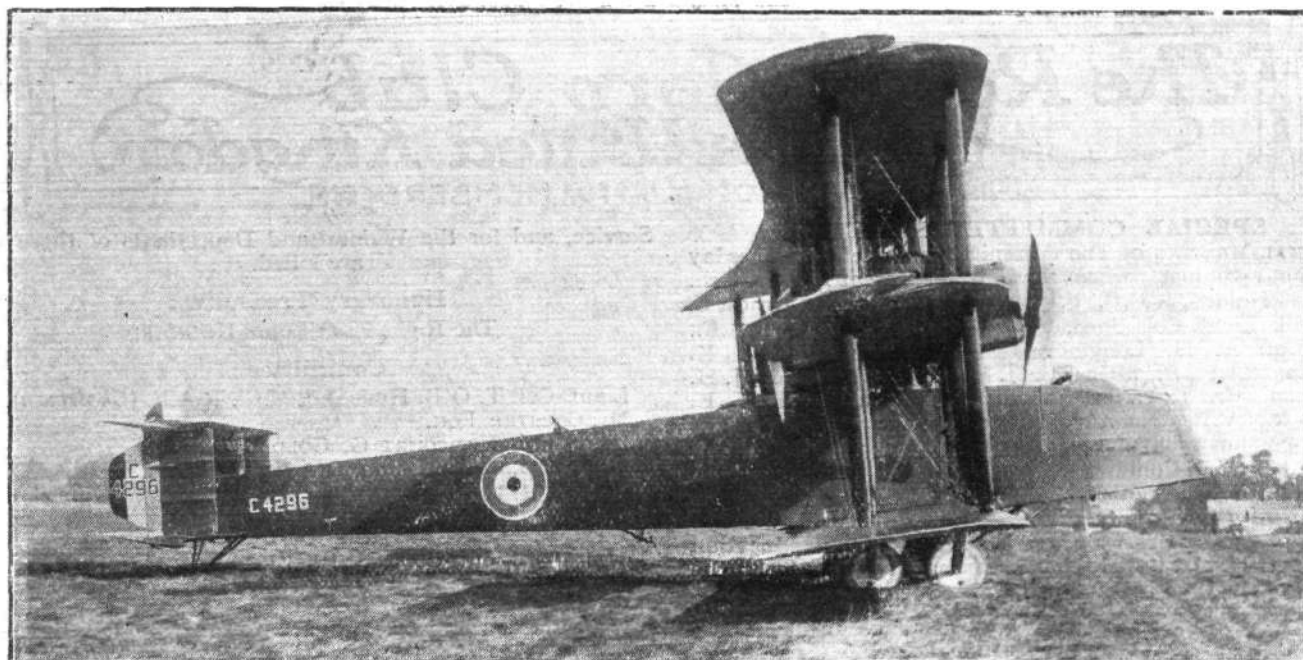
## The Bristol "All-Metal" Biplane

From the earliest days of aviation the question of wood versus metal construction has been the subject of discussion, and both methods have had their supporters. Up till the present, however, the wood construction has been predominating, at any rate in this country. Particular interest therefore attaches to the few examples of the metal construction method that have been built. Among these is the Bristol type MRI, shown in the accompanying illustrations. At the present moment we cannot, unfortunately, publish constructional details of this machine, this must be reserved until another time, but several interesting facts



The Bristol all-metal biplane.





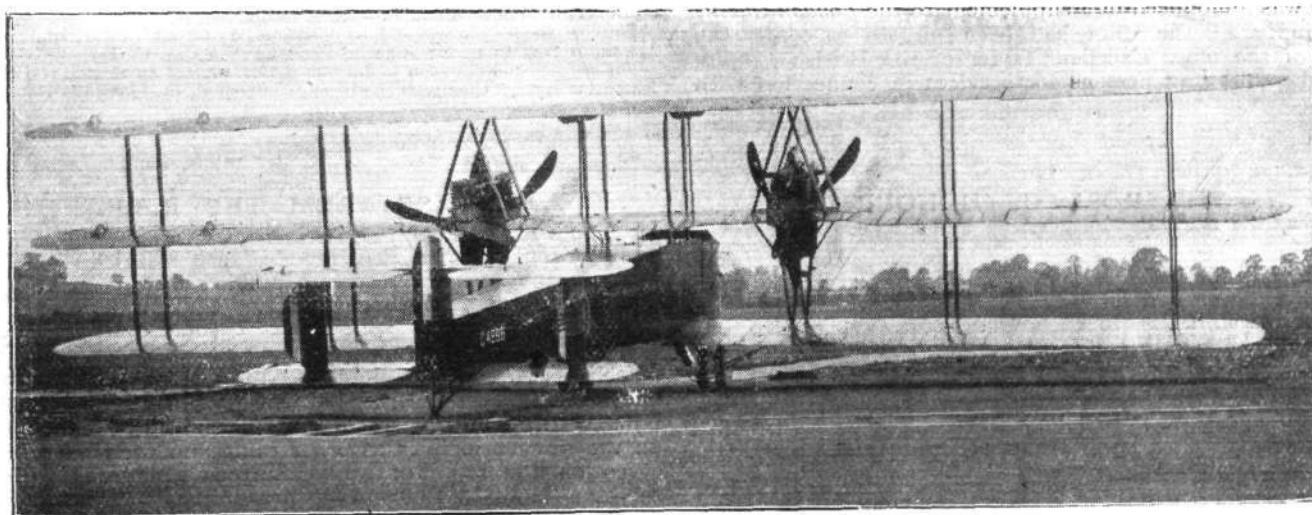
Side view of the Bristol bomber.

emerge from an inspection of the tables of particulars. Thus it will be seen that although the All-Metal machine is of somewhat larger dimensions than the Bristol Fighter, the loaded weight of the two machines is practically the same. Against this must be put the fact that the MRI has a 170 h.p. Hispano engine, while the F2B has a 260 h.p. Rolls-Royce. The All-Metal carries, however, slightly more fuel than does the B.F. The loading per sq. ft. is somewhat smaller for the larger machine, but the load per horse-power is considerably greater, thus accounting for the fact that the MRI has not so good a performance as the F2B. It might be added that the weight, empty, of the B.F., is 1,750 lbs., and that of the MRI 1,700 lbs. It may, therefore, safely be concluded from these particulars that there is no reason to suppose that an all-metal aeroplane cannot be built as light, or nearly so, as one constructed in the ordinary way of wood. There can be little doubt that for use in tropical climates, such as will be encountered by the post-War commercial aeroplane, the metal construction will be better able to withstand the changes in temperature than will one built largely of wood, and while we should not care to assert that the days of wood construction for aeroplanes are over, we do think that metal construction will be more general in the future than it has been in the past.

#### The Bristol Triplane.

While for her largest machines Italy has to a great extent pinned her faith in the triplane, as instanced by the large Caproni triplane bombers, there has been in this country a tendency, rightly or wrongly, to adhere to the biplane type, even for very large machines. That excellent results may be obtained by the biplane form has been amply demonstrated by the large four engined Handley Pages, but it may be

doubted whether the triplane form has been as extensively tested as it deserves. The object of the Bristol Bomber was to provide a high-speed machine for bombing or passenger carrying, capable of lifting a considerable load in addition to the weight of crew and fuel. The "Braemar," as the Bristol Bomber is called, is driven by four Siddeley-Deasy "Puma" engines, developing a total of 1,000 h.p. at 1,500 ft. The manner of mounting the engines will be clear from the illustrations. Two drive tractors while the other two drive pushers, after the manner of the large Handley Page. The two tractors have a diameter of 9 ft. 10 in. and a mean pitch of 6 ft. 11 in., while the diameter of the pushers is 9 ft. 2 in., and the pitch 7 ft. 2½ in. The two pilots' seats are placed side by side in the fore part of the body, some distance ahead of the leading edge of the planes, while the extreme nose of the fuselage is occupied by a gunner. Well aft in the body is another cockpit with two guns mounted on a turntable, while a fourth gun is mounted on another gun ring in the floor of the fuselage. The machine is thus well capable of looking after herself as regards defensive gun arrangements. The weight of the machine empty is 9,300 lbs., and she carries 400 gallons of petrol, 40 of oil, and 30 gallons of water. After allowing 360 lbs. for two pilots, the machine is still capable of lifting another 3,000 lbs., bringing the total loaded weight up to 16,200 lbs. The wing loading, it will be seen, is fairly high, 8½ lbs. per sq. ft., and the load per horse-power is 16.2 lbs. The speed at ground level is 106 m.p.h., which is not bad for such a large machine, and the climb to 10,000 ft. only takes 35 minutes. Naturally the performance cannot compare with that of the smaller machines, but for a weight lifter it is not by any means poor, and the machine might make a good commercial aeroplane for carrying large loads.



Three-quarter rear view of the Bristol bomber.

# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## SPECIAL COMMITTEE MEETING.

A SPECIAL MEETING of The Committee was held on Tuesday last, the 14th inst., when there were present: Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S. (in the Chair), Mr. Ernest C. Bucknall, Lieut.-Col. Spenser D. A. Grey, D.S.O., R.A.F., Lieut.-Col. A. M. Longmore, R.A.F., Lieut.-Col. F. K. McClean, R.A.F., Brig.-Gen. E. M. Maitland, D.S.O., Mr. J. H. Nicholson, Mr. T. O. M. Sopwith and Lieut.-Com. H. E. Perrin, R.N.V.R. (Secretary), in attendance.

A discussion took place as to the future activities of the Club, and a Sub-Committee was appointed to consider the whole question and report.

**Aviation Benevolent Fund.**—It was decided to make a grant of £50 to Mrs. Rowland Ding towards the education of her two children. This amount had been placed at the disposal of the Club by the Shell Marketing Co., Ltd.

## THE FLYING SERVICES FUND

(Registered under the War Charities Act, 1916)

Administered by the Royal Aero Club

For the benefit of *Officers, Non-Commissioned Officers and Men* of the ROYAL AIR FORCE who are incapacitated on Active

Service, and for the Widows and Dependants of those who are killed.

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The Right Hon. LORD KINNAIRD.

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Mr. CHESTER FOX.  
Lieut.-Col. HARCOURT G. GOLD, R.A.F.  
Lieut.-Col. C. E. MAUDE, R.A.F.  
Colonel R. H. MORE, C.M.G., R.A.F.

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H. E. PERRIN, Secretary.

# HONOURS

## Honours for R.N.A.S. Officers

It was announced in a supplement to the *London Gazette* on January 17 that the King has been pleased to approve of the award of the following honours, decorations, and medals to the following officers and men:—

### Distinguished Service Order

Wing-Comdr. C. E. H. Rathbone, R.N.A.S. (Cap. R.M.L.I., now Lieut.-Col., R.A.F.).—In recognition of his gallantry and devotion to duty during the course of a long-distance air raid in which he acted as pilot of a fighting machine which formed part of the escort. Wing-Comdr. Rathbone was brought down whilst protecting the bombing machines, his engine having been put out of action. It was owing to the gallantry and self-sacrifice of this officer and those of the other fighting machines that all the bombing machines returned safely from the raid.

The following decoration has been conferred for distinguished services rendered during the War:—

CONFERRED BY THE KING OF ITALY

Order of the Crown of Italy  
Cavalier

Sub-Lieut. R. L. Cante, R.N.V.R. (now Lieut. R.A.F.).

## Bravery during Air Raids

It was announced in a supplement to the *London Gazette* on January 15, the King has been pleased to confer the Medal of the Most Excellent Order of the British Empire upon the following persons for services in connection with

the War, which have been distinguished by great courage or self-sacrifice, or by exceptional merit:—

Displayed great courage and devotion to duty during air raids:—Telephonists: Ellen Elizabeth Ansell, Violet May Barber, Fanny Caroline Jane Bartlett (night supervisor), Jennie Amy Bennett, Eveline Chester, Kate Elizabeth Coleman, Hilda Louisa Davis, Mary Rose Dawkins (now Mrs. Oakman (night supervisor), Mrs. Emily Gafford (caretaker-operator), Elsie Priscilla Gittings, Mrs. Harriett Matilda Hibbard (night supervisor), Florence Gladys Hutt (supervisor), Alice Naomi Johnson (supervisor), Edith Charlotte Kallend, Mrs. Eliza Jane Ougham (caretaker-operator), Blanche Flora Perritt, Joseph Skinner (night), Constance Hilda Alice Stead (now Mrs. Smith), Emma Ann Wilding (supervisor).

For devotion to duty and high example in a position of great responsibility during air raids:—Supervisor Telephones: Cecelia Kate Hooper, Gertrude Maud Mary Johns.

For courage and devotion to duty on the occasion of air raids:—Frank Andrew Bennie, Mrs. Grace Lizzie Gray (sub-postmistress), Harold W. Wheeler (lance-corporal, London Volunteer Rifles), Joseph Thomas Wise (omnibus driver).

For courage and high example on the occasion of an air raid:—Ellen Birch, Mary Joyce, May Knight, Annie Rate, Caroline Smith, Minnie Wheeler.

For courage and devotion to duty in continuing urgent casting operations throughout an air raid:—Samuel John Beal (skilled labourer, turnaceman), George Coultrip (skilled labourer, stoker and traveller man), Albert Edward Rosekilly (inspector of founders), James S.ephenson (founder).

For highly meritorious performance of duty, especially on occasions of air raid warnings:—Annie Armitage (fire police woman).

For displaying great courage and devotion to duty during an air raid, when the signal-box in which he was working was struck by a bomb:—Joseph Ashton (signalman).

For courage and devotion to duty in rendering first-aid to the injured during an air raid:—Arthur Cannon, Florence Annie Gwendoline Robinson.

For courage and presence of mind during an air raid:—Robert William Gibbons (labourer).

For courage and devotion in assisting helpless patients and injured persons on the occasion of an air raid:—James Heddle.

For conspicuous courage and devotion in carrying out his work under shell fire and during air raids:—Charles Plimston (Y.M.C.A. worker).

For courage and devotion to duty on the occasion of an air raid:—Harriet Katherine Louise Thompson (Lady Superintendent, St. Clement's House).



## THE ROLL OF HONOUR

(When an Officer is seconded from the Army his unit is shown in brackets)  
Published January 18

### Killed

Dobbie, Capt. R. W.	Nicholls, Sec. Lieut. O. L.
Ellercamp, Lieut. W. A. H.	Palmer, Sec. Lieut. J. W.
Holmes, Sec. Lieut. H.	Williams, Sec. Lieut. T. L.
Hurdall, Sec. Lieut. C. D.	

### Previously Missing, now reported Killed

Dyke, Sec. Lieut. E. P. W.

### Died of Wounds

Lindsay-Young, Capt. L. H.

### Died of Injuries

Williams, Sec. Lieut. E. A.

### Died

Graham, Lieut. E. W.	Parfitt, Sec. Lieut. B. N.
Kee, Capt. W. J.	Teunon, Sec. Lieut. J. M.

### Correction:

Plenty, Capt. E. P., should read: Plenty, Capt. (Temp. Maj.) E. P.

## RELEASE FROM THE R.A.F.

It is officially announced that the general scheme of demobilisation for the R.A.F. in France will be similar to that for the Army. A certain number of R.A.F. units in France will, for the time being, be continued on a War footing, the others will then become surplus units. Some of these may be sent home, but in other cases the personnel will be sent home leaving a cadre consisting of one or two officers, clerks, batmen, etc., which will be sent home with the unit records, etc. Officers will be demobilised on the same principles as other ranks, no preference being given on the score of rank. Surplus squadrons will fly their machines to England, to aerodromes specified by the Air Ministry. Observers will not go by air; in the case of two-seater machines an air mechanic will accompany the pilot.



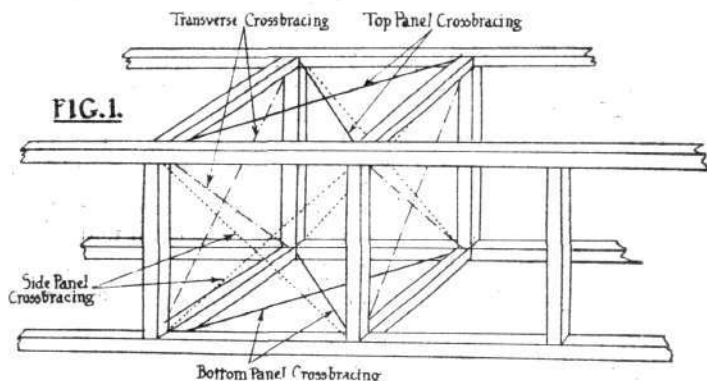
# RIGGING

## THE ERECTION AND TRUEING-UP OF AEROPLANES

By F. W. HALLIWELL, A.M.I.A.E.

### *The Why and Wherefore of Rigging*

CONSIDERING an aeroplane simply as a structure built to resist certain stresses, the necessity for rigging in some form or other, is apparent. In the case of an ordinary tractor biplane, the fuselage is subjected to bending moments, combined with torsion about its longitudinal axis. In general, it resists the bending moments as a cantilever beam, supported for some loads at its centre of gravity and for others at its centre of lift, both of which are situated somewhere approximately just behind the front spar of the top plane in a moderately staggered biplane. The usual construction consists of four longitudinal members or *longerons* running the entire length of the machine, braced together by struts and diagonal wiring so that the whole forms a box lattice girder.



Each of these panels in the side of the fuselage helps to take bending moments in an upward or downward direction, while the corresponding panels in the top and bottom enable the structure to stand up to side loads of a similar nature.

Fig. 1 shows fuselage wiring.

Looking at the fuselage at right angles to its length the internal panels, formed by the struts running transversely across the top and bottom, and down the sides, are also braced by diagonal wiring, so that each separate bay in the fuselage structure forms by itself a complete rectangular cell,

being stressed according to the reaction obtaining at their point of anchorage. They are known as "flying wires" because they function only while the machine is in flight. When the machine is stationary upon the ground the reverse conditions obtain, the wings are supported by the fuselage and the stress in the wing structure is reversed in direction, the bottom plane being in compression and the top in tension. The opposite wires, marked "L," are sustaining the weight of the planes; these are called "landing wires." If the wing covering were stripped off it would be seen that each plane is braced internally between the front and rear spars in an exactly similar manner, viz., by means of interspar struts and diagonal wiring. This is in order to resist the stresses set up in a direction opposite to that in which the machine is travelling by the drag of the planes.

From the foregoing it will be seen that the function of the rigging or wire bracing of an aeroplane, is simply to hold the structure together with the necessary rigidity which will enable it to withstand the stresses it is subjected to. The term "rigging" is often used to imply the assembly of the completed units of a machine, and the subsequent adjustment of all the external wiring, but taken in its wider sense it should mean the fitting of the whole of the wire bracing in every part of an aeroplane, and the correct adjustment of same. The operations of correctly adjusting the wiring in all components is known as "trueing-up," and is probably the most difficult part of the rigger's work. It will thus be seen that rigging begins in the factory, as soon as the assembly of either fuselage or wings commences.

### *Construction and Erection*

Inseparably associated with the actual wire bracing of a machine, are the struts and other wooden members, which, together with the wiring, form the cells and panels which constitute the structure; and the better the rigger understands the nature of the material with which he has to deal, the better is he fitted for his work.

Before timber can be regarded as a material, it must be properly seasoned. Unseasoned wood should be looked upon as raw material, much as iron ore, or similar natural products; it is just as unfit for use, and needs treatment, which if properly understood is just as involved. Actually,

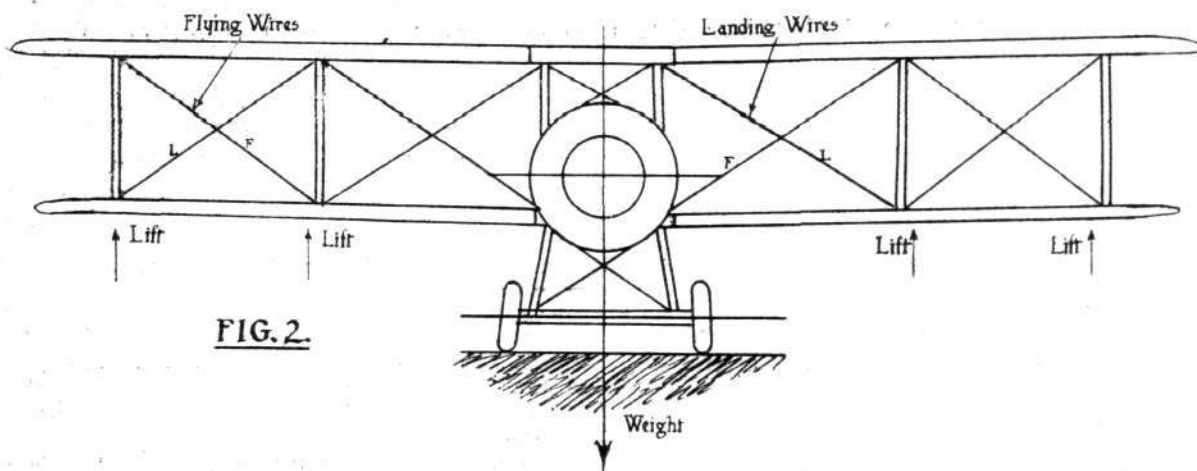


FIG. 2.

the six sides of which are composed of bracing wires. This transverse wiring from the top longeron, on one side, to the bottom longeron on the other side, and vice versa, renders the fuselage capable of resisting torsion.

The main planes are also subjected to cantilever loads, and in a biplane arrangement they form a truss girder suitable for taking such stresses. The top and bottom planes are braced together by means of interplane struts and cross-bracing wires or cables. Fig. 2 shows a typical arrangement. When the machine is in flight its weight is being supported by the planes, which are loaded as cantilevers supported at the fuselage. The stress set up in each pair of wings (top and bottom pairs) resolves into tension in the lower plane, and compression in the top plane, and compression also in each interplane strut. While the load is in this direction, that is, the machine is flying, the wires marked "F" are

wood is not a material, it is a structure, and its construction varies with the species of tree it is obtained from. Its constituents are hollows and generally spindle shaped or tubular. These constituents fit closely together, honeycomb fashion, and each cell contains either water, or air, or both; the walls of these cells are composed of what may be termed wood substance. The process of seasoning consists of the drying up of the water contained in these constituents during which drying the wood shrinks. The effect of seasoning is to decrease the weight of the timber, while increasing its strength, hardness and elasticity, as distinct from pliability. The increase in strength is directly proportional to the decrease in weight. In effect, the seasoning process turns the natural product into a material fit for the constructor's use.

(To be continued)

# MEDICAL NOTES

## THE WEAR AND TEAR OF FLYING

By Captain T. S. RIPPON., R.A.F. Medical Service

ONE of the problems the commercial aircraft firms will have to face when passenger work becomes common will be how their pilots are lasting.

It is obvious that a pilot who has to fly regularly in all sorts of weather will require a rest periodically.

How is one to discover this? Fortunately one of the great discoveries of the War from a medical standpoint was made by a specialist at the R.A.F. Medical Research Department—Lieut.-Col. Flack—who before the War was associated with Professor Leonard Hill, the well-known physiologist and expert on oxygen.

Lieut.-Col. Flack, who is a physiologist, discovered by a series of examinations of successful pilots and of pilots sent back from France for a rest that one of the indications of "stress" was fatigue of the various bodily systems (respiratory, circulatory, and nervous), and he invented a simple and ingenious method of testing this fatigue. A glass U-tube containing mercury was connected with a rubber tube fitted with a mouthpiece which the pilot put in his mouth and, after taking a deep breath, blew down it, forcing the column of mercury up the other end of the tube.

It was found that the tired pilots could not blow the mercury half as high as the fit ones. A further modification of this test consisted in instructing the pilot to blow the mercury to a certain height, and then to keep it there as long as possible—at the same time observations were made of the character of the pulse and length of time the pilot was able to hold the column of mercury at the required height, an indication of the degree of fatigue in this way was confirmed.

It has been admitted that the British methods of examination of pilots are second to none—and one of the chief points of the examination is this fatigue test. By these and other methods, therefore, we are in a position to assure the passengers, before they put their lives in the hands of a pilot, that he is fit and not suffering from fatigue.

### Methods in Use by French Doctors in Examining Pilots

There are two points about the French system which differ from ours:—

(1) *Examination for self-control and ability to keep cool in moments of danger* (*Réactions émotives*).—This is done by means of a pneumograph which is fixed round the thorax of the candidate; and to one of his hands is fixed a Hallion and Comte finger apparatus, the pneumatic pocket of which measures the variations in the peripheral circulation of the blood by which the action of emotions on the circulations is recorded, under the influences of the vaso-motor nerves.

A Verdin recorder which registers trembling is placed in the candidate's other hand. These three apparatus are connected by pneumatic tubes, each having a drum which is placed opposite the cylinder of a Marey recorder.

This gives graphs of the respiratory system, vaso-motor system and trembling.

Unknown to the candidate the examiner fires off a revolver near the candidate and according to the extent of the oscillations of the graph, so the candidate is regarded as fit or unfit.

### Value of Test for British Candidates

Self-control is usually a marked characteristic of the average British candidate and consequently not so necessary to test as is the more emotional Latin type. There is, however, an instinct which the active service pilot needs, viz. the instinct of pugnacity which might with advantage be tested.

### "Anger" as a Test of the Fighting Type

The aggressive type is quickly provoked to anger, and he is the most useful on active service. Anger can be provoked by threatening to oppose the wishes of the candidate, making disparaging remarks about him, or in numerous ways. A brief psycho-analysis would give the key to the method of stimulating the candidate's anger, and a prompt response would be considered satisfactory.

### Examination of Reflex Reaction Time

By a reflex action we mean the movement of a muscle through the nerves coming from the brain and spinal cord, caused by a stimulation of afferent nerve fibres (e.g. visual, auditory or tactile).

The total time between the application of the stimulus and the beginning of the response can be determined by special apparatus.

The reaction time varies with the conditions of the nerve centres, being lengthened by fatigue, lack of oxygen, alcohol,

morphia and other conditions that depress the irritability of the nerve cells.

In pilots suffering from the results of concussion and stress of service the time shows marked variations, being alternately rapid and very slow.

The efficient pilot is the man who, rapidly informed by his senses, performs the necessary action as quickly as possible, that is, the man in whom, in the language of psychologists, psychomotor reactions take place in the minimum time.

The value of the test is so well known that it is not necessary to emphasise it.

Recently however, it has increased in value, as it is a valuable indication of impairment of efficiency at heights.

The difficulty at present is the supply of recording apparatus which will measure in hundredths of seconds, this however it is hoped to overcome by producing a simple instrument which will be available for all medical officers engaged in examination of pilots and candidates.

### Changes in Reaction Time at Heights

As the result of a series of experiments with the decompression chamber it has been demonstrated that (i) the reaction time is prolonged at heights; (ii) that pilots suffering from "stress" show an unusually long and sometimes erratic response at heights.

This result is important because with a continuous supply of oxygen the aviator can keep himself practically normal.

### Italian Methods.

The points which [the Italians lay stress upon are as follows:—

- (1) Good mental constitution.
- (2) Healthy physical constitution.
- (3) Normal nervous system.

They state that the pilot should have a physical constitution such as will enable him to take in rapidly all that is going on around him with quick reflexes following the stimuli and leading to movement of the levers of the machine which he is piloting. It is also necessary for him to have good capacity for concentrating his attention and that his attention should be able to extend over a large area. It is also necessary that he should be gifted with accurate and quick powers of observation. Besides having these aptitudes the pilot should be as little emotional as possible, so that no great alteration in his respiration and circulation should take place.

These are the physical reactions of psychical phenomena, and they show a more or less emotional psychical constitution.

Besides this an examination of the respiratory organs and circulation must show that the influence of the rapidity with which variations of altitude occur and the influence of altitude itself does not exceed a normal average.

### Psychical Examination

*Attention, powers of observation, and capacity of perception of certain things* are tested by the mental tests employed by Rossolino.

"Each subject had to undergo the whole series of corresponding tests (the description of which it is not necessary to give again here) and the result of this series of investigations was expressed in figures and graphs. The power of attention (its degree of concentration and extension) the power of accurate perception of certain things and particulars (the *Mehrfachkeir* of the German psychologists) and the powers of observation, etc."

### Value of Psychological Tests for Mental Fatigue

They notice a great mental exhaustion in aviators after even the shortest flights. The method employed to measure the time of the reaction to sensory stimuli (measured before and after flight) proved that even after flights of very few minutes' duration the times of the reaction became considerably greater, as also was the divergences from the average. In default of suitable apparatus, Gemelli proved by counting and comparing the number of disconnected syllables which the pilots were able to remember before and after flying that they made a great number of mistakes, the evident result of considerable mental fatigue, and that this fatigue was not proportioned to the effort expended.

### Reaction Time Examination.

The Italian method appears to be more detailed than the French.

Besides subdividing tactile responses into sensory, muscular and mixed reactions, they state that each individual has his own mode of reacting to sensory stimuli peculiar to



himself, and that it is necessary to find out the "Mode of Reaction" of each pilot.

They do not attach so much importance to the time of the reaction as to the divergences from the average in each reaction.

#### *Experiments on Blood-Pressure during Flight*

They demonstrated that the cardio-vascular apparatus has to make considerable efforts during flight and that cardio-vascular fatigue results, which ultimately causes cerebral anæmia.

#### *The Ergoesthesiograph*

This apparatus gives graphs of the manipulative ability of the candidate to work the controls.

The candidate is blindfolded, and holding a handle in his hand, feels the variations in resistance and tries to oppose it by muscular force so as to keep the lever steady.

#### *American Methods*

The Americans have done an extensive series of examinations in order to select the most suitable candidate.

Their organisation is excellent, their pilot's medical history sheet is beyond criticism, and they have instructed their flight surgeons in the mental hygiene of their pilots, so as to delay or prevent the onset of anxiety neuroses.

They have over-multiplied many of their tests, and some of the psychological apparatus are far too elaborate for routine work. A general survey of their early methods suggests that they selected their pilots on the lines laid down by university professors with only academical knowledge of aviation. Their methods depend also on a large personnel of medical specialists and an unlimited supply of candidates.

In estimating the nervous capacity to withstand strain, the American examiners give particular attention to the following points:—

## A METEOROLOGICAL "MILESTONE"

ON January 21 *The Times* inaugurated a new feature in the shape of a wind record of the previous day and a forecast of the day's weather, from the flying point of view. This is worthy of record, as being the first time such special information has been published in the public newspapers. While *The Times* deserves all credit for their enterprise, it does appear that the collating of such important information should not be left in private hands, but should be a matter for the Meteorological Office or some official department. During the War, the three services, Navy, Army and Air Force, have each maintained their meteorological services, and the study of the weather and its effect on various operations has developed very considerably under such conditions. From the many Service stations it should be possible to collect information which would permit of the compilation of records and forecasts which should be much more complete and valuable than could ever be attained by private enterprise.

We reproduce below, by way of record, the first of this series of wind records and weather forecasts:—

#### *Flying Prospects for To-day*

**SOUTH-EAST ENGLAND.**—Wind at 1,500 ft., S.S.W., 40 to 50 m.p.h., decreasing and veering later; surface wind between 20 and 30 m.p.h.

**SOUTH-WEST ENGLAND.**—Wind at 1,500 ft., N.W., 35 to 40 m.p.h.; surface wind 20 to 30 m.p.h.

**NORTH-WEST ENGLAND.**—Wind at 1,500 ft. W., 15 to 20 m.p.h.; surface wind 10 to 20 m.p.h.

#### *The Air Ministry—An Independent Department*

THE Secretary to the Air Ministry is authorised to state that the status of the Ministry is in no way changed. It remains a completely separate and independent Ministry, the sole connection with the War Office being that one Secretary of State controls both Departments. The Royal Air Force also remains a separate and independent force, its relations with the Navy and Army continuing unaltered.

The Air Ministry is proceeding, in general accordance with the recommendations of the Civil Aerial Transport Committee, to carry into effect legislation and international agreements required to enable civil aviation to be begun again as soon as possible. To provide for the needs of the Royal Air Force, reorganisation of the Air Force is necessary, and it is being prepared.

Meanwhile, the following arrangements will be made:—The Orders in Council constituting the Air Council will be amended so as to provide that the Parliamentary Under-Secretary of State (Major-Gen. Seely, C.B., C.M.G., D.S.O.), who is *ex officio* Vice-President of the Air Council, will be charged with the responsibility to the Secretary of State for

1. What were the chief reasons influencing the aviator in choosing this branch of the service? They consider that indecision, a sense of inadequacy or regret at having chosen unsuitable work may result in a chain of symptoms culminating in a psycho-neurosis.

2. Impressions of the aviator's readiness or disinclination to face difficult situations fairly and squarely. An experienced and daring aviator may lose nerve suddenly as the result of not having definitely settled some trivial event of a personal nature.

3. The question should be asked whether the members of the family approve of flying, making it easy or difficult for him to devote his entire attention to his work.

4. Notice should be taken of the occurrence of nervous or mental disorders in the family history.

#### *Mental Hygiene*

They state that informal conferences should be of practical value. The demoralising effect of intemperance, using the word in a broad physiologic sense, the paralysing effects of worry over unsolved personal problems, of the failure to get square with life, of anxiety about anticipated events, and the shock caused by suddenly awakening to the realisation of the fact that the lure of wish-directed thoughts make an individual incapable either of judging or facing reality!

#### *Conclusion*

We consider that although the French, Italian and American pilots have done splendid work, yet we do not believe any nation has equalled the British aviators in endurance.

The wonderful work of the Independent Air Force—the work of the long-distance bombing and reconnaissance pilots—these facts show how excellent our material is, and how sound the methods of the R.A.F. Medical Service has been in conserving the fit pilots and detecting the early signs of wear and tear.

Rainy conditions at first are likely to give place to showers and fair intervals later. Considerable low cloud will probably prevail over the greater part of our area during the earlier part of the period, but as the depression moves gradually to eastward, some improvement will probably set in. Visibility is likely to be bad at first, but to improve in the course of the day. There is little probability of fog in any part of our area.

<sup>1</sup> NOTE.—Wind prospects at 1,500 ft. are given because it has been found that the velocities at that level are usually in close agreement with those calculated from the distances between the isobars. On a majority of occasions an increase in velocity is to be expected above that height.

#### AVIATION WEATHER

Monday, January 20, 1919.—Morning Observations. Wind Direction and Velocity in the Upper Air

District	Height above ground			
	2,000 ft.	5,000 ft.	10,000 ft.	15,000 ft.
	m.p.h.	m.p.h.	m.p.h.	m.p.h.
Scotland, E. ..	S. 22	S. 28	—	—
England, N. ..	S.S.E. 37	—	—	—
England, N.W.	S.S.W. 14	S.W. 13	—	—
England, E. ..	—	S.S.E. 19	N.W. 43	W. 23
Ireland, S.W. ...	—	—	—	—

Velocities are given in miles per hour.

all the business of the Air Council under the general direction of the Secretary of State. The responsibility hitherto placed on the Parliamentary Under-Secretary of State for the finance, contracts and lands business of the Royal Air Force will be transferred to Lord Londonderry, who will be appointed an additional member of the Air Council, and, at the request of Lord Curzon, will represent the Air Ministry in the House of Lords.

#### *Offences in the Air*

SIR ARCHIBALD BODKIN has been appointed by the Attorney-General a member of the Sub-Committee for Offences in the Air, of which Sir Ernest Pollock, K.C., Solicitor-General, is chairman.

#### *Ban on Women Pilots*

We understand that an Order has been issued by the Air Council forbidding women in the Women's Royal Air Force learning to fly. The reason assigned for this ban is lack of facilities, owing to demobilisation. It is stated unofficially that Mrs. Gwynne Vaughan, commandant of the Women's Royal Air Force, has been taking lessons in flying since Christmas Eve.

# REPATRIATED

The following R.F.C. officers who were prisoners of war in Germany have been released, and have arrived in England. Where an officer was seconded his original unit is indicated in brackets:—

Allabarton, Lieut. S. F.  
Barton, Lieut. A. S. S. (R.F.A.).  
Cairns, Lieut. J. A. (Arg. and Suth. Highrs.).  
Davies, Sec. Lieut. J. E. (Lond. R.).  
Denison, Lieut. E. B.  
Denison, Sec. Lieut. N. C., K.O. (Yorks L.I.).  
Goodall, Capt. J. H. H. (York and Lancs. R.).  
Hamilton, Lieut. H. D.  
Johnson, Capt. J. E. (Ches. R.).  
Lees, Lieut. J. C. (R. Sco. Fus.).  
Lodge, Lieut. C. F. (Worc. R.).  
McDonald, Lieut. D. P. (Yeo.).  
Martin, Lieut. A. W. (Yorks R.).  
Nobbs, Lieut. C. H. F.  
Rackett, Lieut. A. R.  
Rogerson, Lieut. H. (L.N. Lan. R.).  
Schrieber, Lieut. R. F. B. (Suff. R.).  
Sharpe, Capt. F.  
Sharpe, Lieut. S. A.  
Smith, Lieut. R. M.  
Stead, Lieut. G. C.

Stead, Lieut. M. W. B.  
Stewardson, Lieut. E. A. (Queen's R.W. Surr. R.).  
Strange, Sec. Lieut. L. A. T. (Bufs, E. Kent R.).  
Streets, Sec. Lieut. A. H., M.C.  
Sutherland, Lieut. A. M. (Northd. Fus.).  
Taplin, Lieut. L. T. E.  
Thompson, Lieut. C. D. (H.A.C.).  
Upson, Sec. Lieut. R. H. (Queen's R. W. Surr. R.).  
Winkler, Lieut. W. O. B. (R.G.A.).  
Costello, Capt. W. H. (R.G.A.).  
Dougall, Lieut. C. R. (Argyll and Suthd. Highrs.).  
Lloyd, Lieut. E. A. (Yeomanry).  
McMichael, Lieut. G. B. (Hereford R.).  
Maxted, Lieut. O. D. (Bufs, E. Kent R.).  
Samuel, Lieut. J. R. (Welsh R.).  
Savory, Lieut. A. J. (Yeomanry).

Dunster, Lieut. C. H.  
Eason, Lieut. A. T.  
Elphinston, Lieut. C.  
Falkenberg, Lieut. G. D.  
Faraday, Lieut. M. S.  
Fenwick, Lieut. T. B.  
Ferguson, Lieut. J. A. A.  
Gray, Sec. Lieut. G. M.  
Haight, Lieut. J. L.  
Hallam, Lieut. H. A.  
Harris, Lieut. H.  
Haseler, Lieut. G. F.  
Helder, Lieut. L. B.  
Hewson, Sec. Lieut. F. A. A.  
Hills, Lieut. F. E.  
Hodge, Lieut. G. G.  
Inman, Lieut. H.  
Jay, Lieut. T. W.  
Johns, Lieut. T. M.  
Jones, Lieut. W. H.  
Keller, Capt. C. F.  
Kennedy, Sec. Lieut. C. J.  
Loyd, Lieut. E. E. F.  
McConnell-Wood, Lieut. A.  
Mann, Lieut. F. A.

Mathew, Lieut. C. G.  
Middlebrook, Lieut. N.  
Money, Lieut. R. R.  
Newman, Lieut. C. D.  
Nicholson, Lieut. G. H.  
Nightingale, Capt. A. J.  
Organ, Lieut. A. F.  
Palmer, Sec. Lieut. G. H.  
Pinkerton, Lieut. A. L.  
Redpath, Lieut. H. S.  
Reynell, Lieut. A. W.  
Roberts, Lieut. C. L.  
Sams, Lieut. F. D. H.  
Smith, Lieut. E. A. L. F.  
Smith, Lieut. J. S.  
Smith, Lieut. V.  
Spearpoint, Lieut. H. G.  
Stephens, Lieut. C. H.  
Sutcliffe, Lieut. C. A.  
Wadden, Lieut. G.  
Watson, Lieut. M. J.  
Wigley, Lieut. L.  
Wilson, Capt. R. E.  
Woodland, Lieut. P. M.

Published January 16.

The following R.A.F. officers have been repatriated:—

Published January 14.

Adamson, Lieut. C. P.  
Anderson, Lieut. D. S.  
Askin, Lieut. S. C. J.  
Beldam, Lieut. C. H.  
Belliveau, Lieut. A. H.  
Booth, Capt. H. H.  
Bowers, Lieut. P. T.  
Bowring, Lieut. J. V.  
Boys, Sec. Lieut. R. H. G.  
Brown, Lieut. H. M.  
Burton, Lieut. E.  
Carter, Lieut. R. N.  
Castle, Lieut. A. F.  
Chainey, Lieut. F. H.  
Chalkin, Sec. Lieut. W. J. N.  
Challis, Sec. Lieut. M. E.  
Clutterbuck, Lieut. L. C. F.  
Coleman, Lieut. C. B.  
Coombs, Lieut. V. C.  
Crammond, Lieut. G. R.  
Cudmore, Lieut. E. O.  
Cullen, Lieut. W. D.  
Cutbill, Lieut. E. H.  
Dawes, Lieut. A. F.  
Dean, Lieut. H.  
Duke, Lieut. R. E.  
Durkin, Lieut. F. V.  
Fenton, Lieut. C. B.

Garratt, Lieut. J. C.  
Garrett, Lieut. B. N.  
Hall, Sec. Lieut. W. E.  
Hedley, Capt. J. H.  
Henry, Lieut. F. R.  
Hills, Sec. Lieut. J.  
Hopgood, Lieut. F. J.  
Hunt, Lieut. K. F.  
Isbell, Lieut. A. T.  
Killick, Sec. Lieut. C. H. P.  
Kirkman, Capt. K. R., M.C.  
Knowlden, Lieut. W. E.  
Laurence, Capt. C.  
Leggatt, Lieut. C. W.  
Lewis, Lieut. A.  
Lowson, Lieut. J. H.  
Mahony, Lieut. M. F. J. R.  
Mase, Lieut. H. F.  
Mayne, Lieut. R. A.  
Molloy, Lieut. T. P. L.  
Papworth, Sec. Lieut. A. S.  
Patey, Capt. H. A.  
Roberts, Lieut. H. J. W.  
Rose, Sec. Lieut. D.  
Rose, Sec. Lieut. R. H.  
Sutcliffe, Lieut. J. E. T.  
Swayze, Lieut. W. K.  
Thatcher, Sec. Lieut. A. R.

Adams, Lieut. F.  
Alder, Lieut. S.  
Ballance, Lieut. G.  
Birkhead, Lieut. J. B.  
Blackall, Lieut. J. H.  
Broughall, Lieut. H. S.  
Chalmers, Lieut. B. G.  
Clark, Lieut. W. B.  
Cock, Capt. G. H., M.C.  
Colbert, Lieut. L. A.  
Cook, Sec. Lieut. C. W.  
Deane, Lieut. G. S.  
Deason, Capt. T. G.  
Fitzgerald, Lieut. J. J.  
Fitzgerald-Uniacke, Lieut. D. P.  
Godard, Lieut. J. S.  
Grosset, Capt. W. E.  
Hammond, Sec. Lieut. H. T.  
Handley, Lieut. J.  
Heagerty, Lieut. J. S.  
Heath, Lieut. E. E.  
Hervey, Lieut. H. E., M.C.  
Hills, Lieut. W. B.  
Ingleson, Lieut. W.  
Johnston, Capt. J. E.  
Kaizer, Sec. Lieut. M. M.  
Kent-Jones, Lieut. D. W.  
Kingsland, Lieut. W. R.  
Lamont, Lieut. W.

Lawton, Lieut. J. B.  
Leavitt, Lieut. H. J.  
Lewis, Lieut. D. G.  
Macintosh, Lieut. R. R.  
Mallons, Lieut. C. G.  
MacGregor, Sec. Lieut. R. R.  
Mitchell, Lieut. H.  
Moody, Sec. Lieut. B. C.  
Osborn, Sec. Lieut. C. C. F.  
Potts, Sec. Lieut. W. J.  
Powell, Lieut. D. G.  
Roberts, Lieut. R. M.  
Robertson, Lieut. G. P.  
Rothery, Lieut. H.  
Shadwell, Sec. Lieut. L. M.  
Shum, Lieut. C. A. R.  
Smith, Lieut. C.  
Smythe, Lieut. C.  
Spiro, Lieut. S. G.  
Stevens, Lieut. A.  
Taylor, Lieut. A.  
Thompson, Lieut. C. D.  
Thornton, Sec. Lieut. C. P.  
Tysoe, Lieut. C. G.  
Wellby, Lieut. H. S.  
White, Capt. P. R.  
Whittle, Capt. O. L.  
Williamson, Lieut. J. C.  
Wingate Gray, Lieut. A. G.

Published January 17.

Anderson, Lieut. A.  
Andrews, Lieut. G.  
Briggs, Lieut. S. P.  
Burnard, Lieut. R. A.  
Cairnes, Lieut. D. S.  
Chance, Lieut. W. H. S.

Published January 15.

Cole, Lieut. K. R.  
Crisp, Lieut. A. R.  
Cushing, Lieut. D. V.  
Davies, Lieut. C. W.  
Dingley, Lieut. R. L.  
Dunn, Sec. Lieut. R. H.

Baddeley, Sec. Lieut. E. L.  
Boyle, Sec. Lieut. J. C.  
Breckenbridge, Lieut. W.  
Connolly, Sec. Lieut. S. M.  
Cox, Lieut. G.

Davies, Sec. Lieut. H.  
Evans, Sec. Lieut. W. D.  
Harrison, Sec. Lieut. A. G.  
Johns, Sec. Lieut. W. E.  
Kier, Sec. Lieut. J. N.

## From Turkey

White, Capt. T. W. (Aust. F.C.).



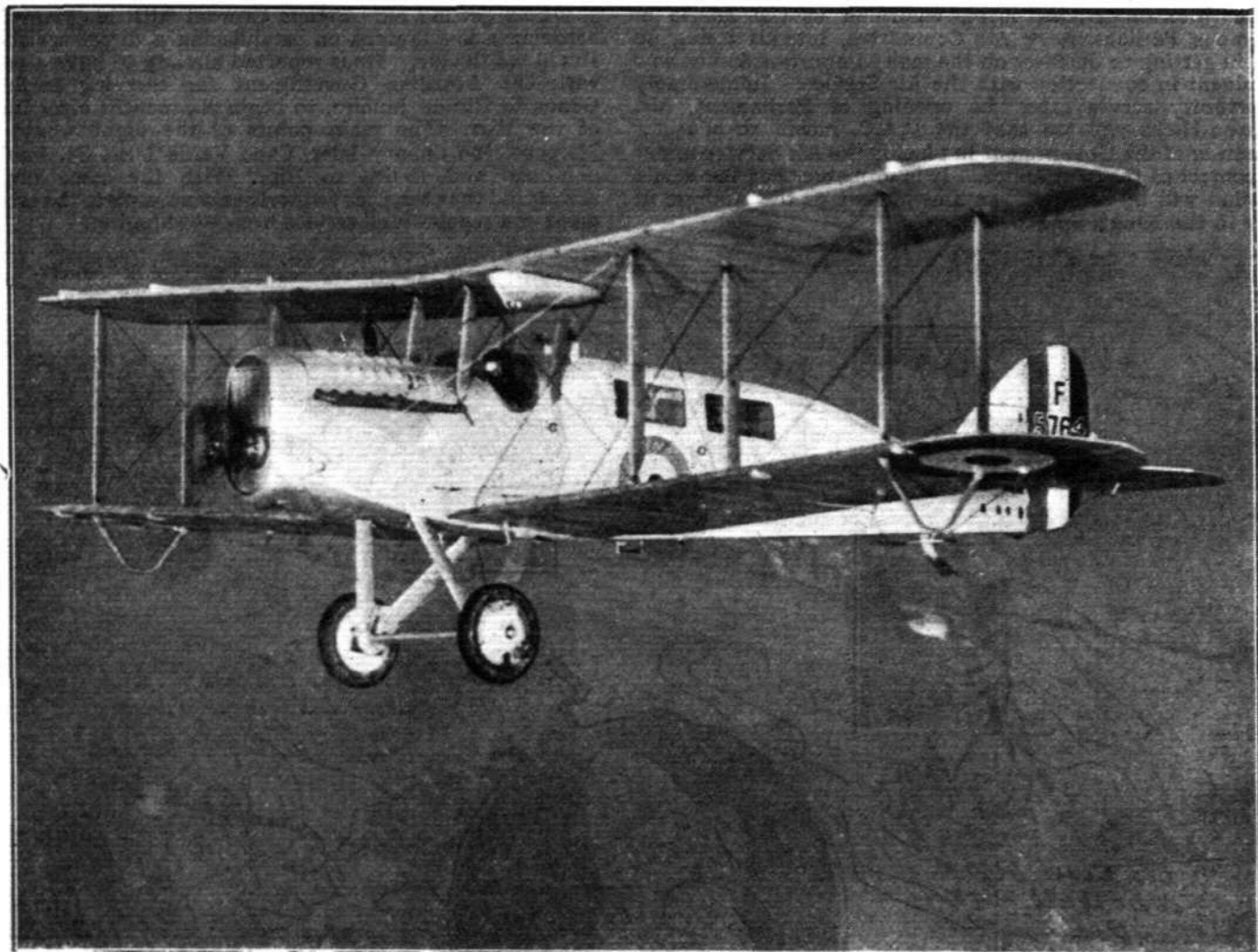
A Sopwith "Snipe," B.R. 2 engine, presented by Leicester to Canada at Hendon on January 21



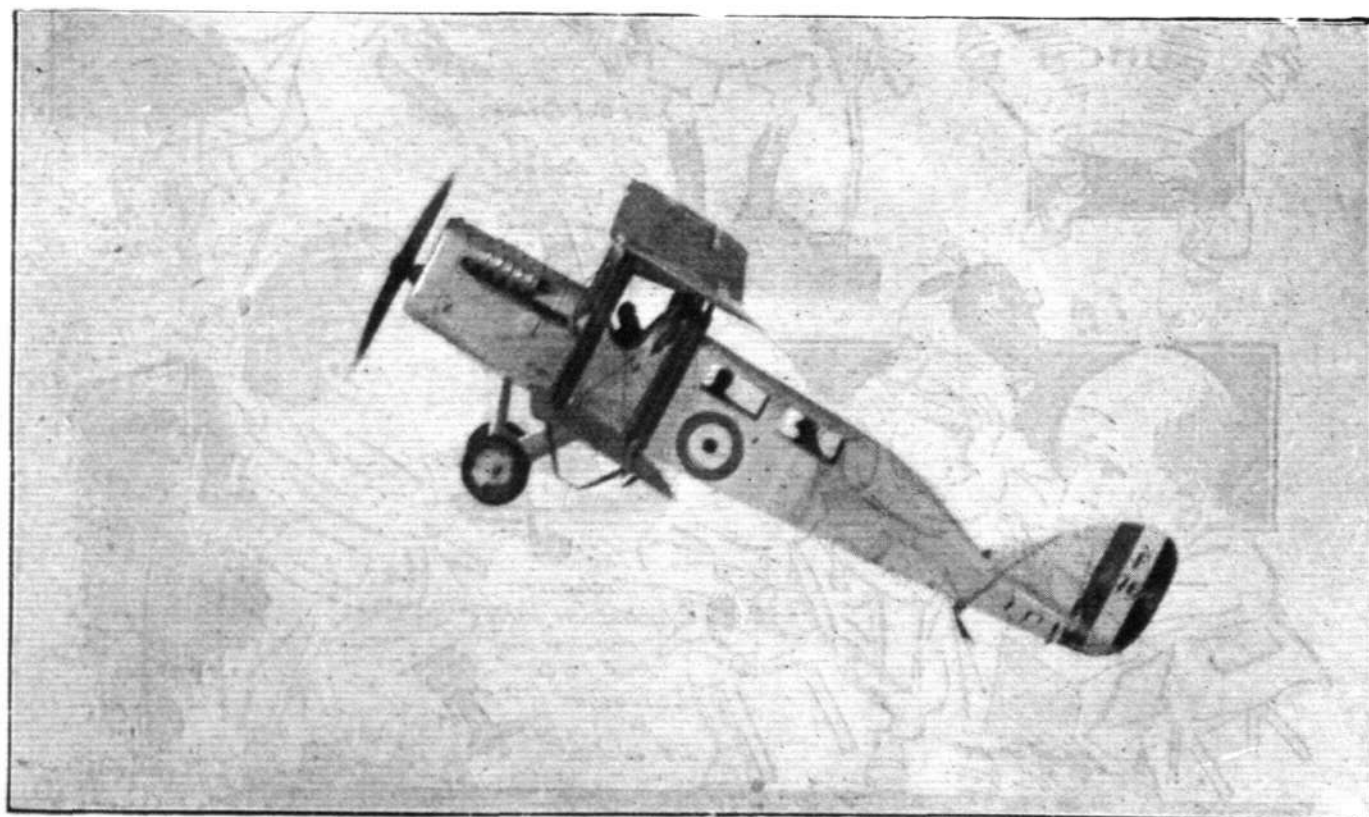
## THE ENCLOSED D.H. 4

In our issue of April 19, 1917, we commenced a series of articles describing the "Totally-Enclosed" aeroplanes that had been built up to that time. We then pointed out that when the problems of peace flying have to be tackled, there is every probability that the occupants of an aeroplane will be comfortably seated inside a cabin, out of the rush of air. This appears now to have come about, as instanced

by the Airco or D.H. 4 biplane, which has been converted into a comfortable touring machine, seating two passengers inside a cabin provided with windows. These machines are intended to take Peace Delegates and their secretaries to and from Paris. The simple manner in which this conversion into an enclosed machine has been carried out will be clear from the photographs.



AN AERIAL LIMOUSINE.—A D.H.4 converted into an enclosed passenger carrier. The pilot is, however, left out "in the draught."



The D.H.4 ENCLOSED MACHINE CLIMBING.—The manner in which the two passengers are seated facing one another is clearly seen in this photograph.

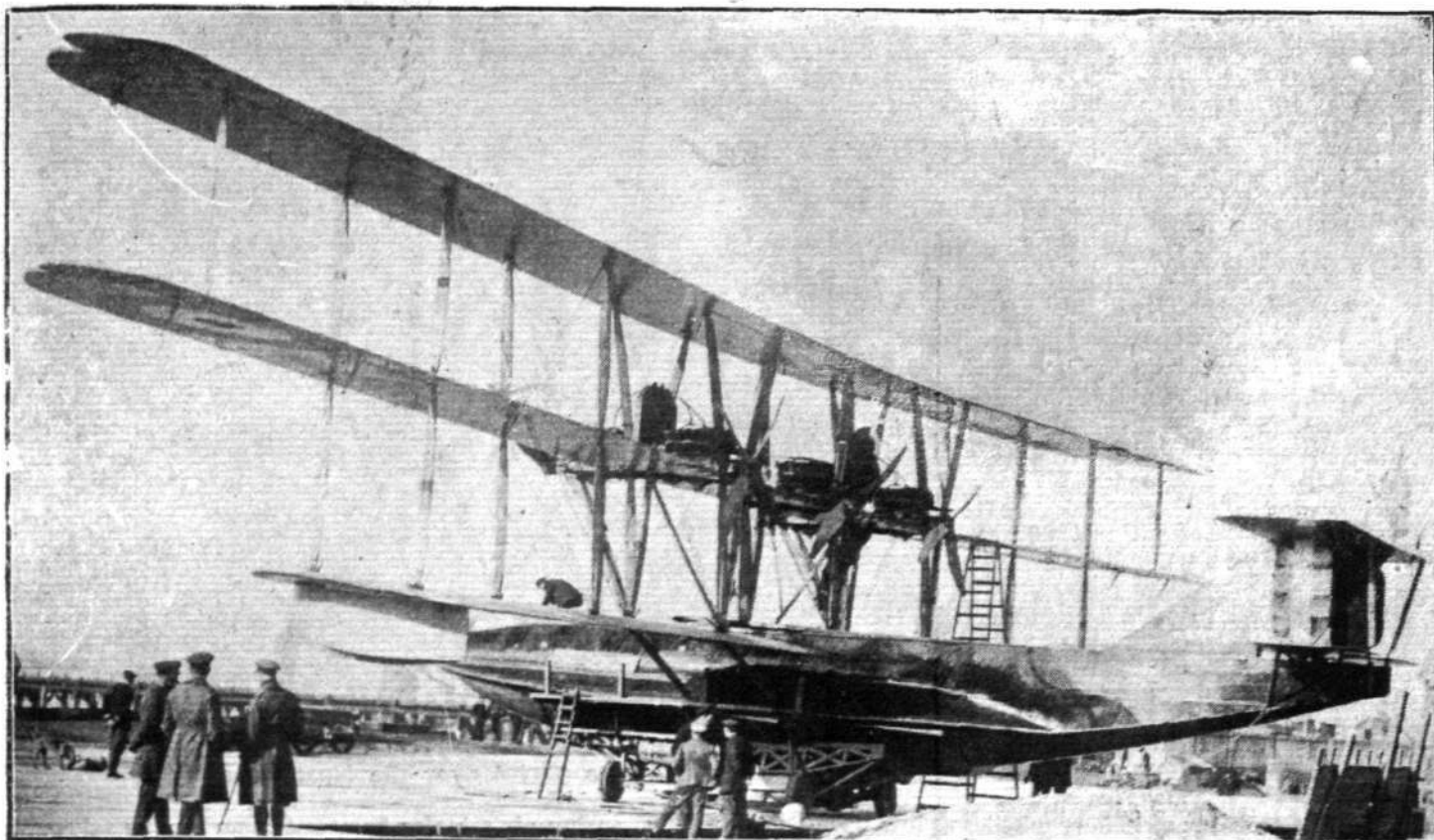


MR. JOYNSON-HICKS, M.P., chairman of the House of Commons Parliamentary Air Committee, intends losing no time in getting to business on the many important issues now prominent in connection with the Air Service. Immediately opportunity serves after the opening of Parliament, Mr. Joynton-Hicks will see that the P.A.C. meets to consider the action of the Government in placing the Air Service under the control of the War Office. It is probable that the whole question will be raised by an amendment to the Address in reply to the King's Speech.

WE'RE getting on. Signor Caproni with his giant Italian aeroplanes has designs on establishing a direct service with Brazil via the air. He is reported already to have a contract with the Brazilian Government for carrying mails from Genoa to Rio de Janeiro, to begin six months after the close of the War. The main points of the flight would be at Morocco, the Canary Isles, Cape Verde Isles, St. Paul, Pernambuco and Balica to Rio. With the same objective, it is stated that the U.S. authorities contemplate the establishment of a regular mail service from Washington.







A three-quarter rear view of the Porte Super-Baby Triplane Flying Boat. *British Official.*

THE Imperial War Museum is to be the resting-place of the first shell fired from London at a Zeppelin. Sounds a bit duddish.

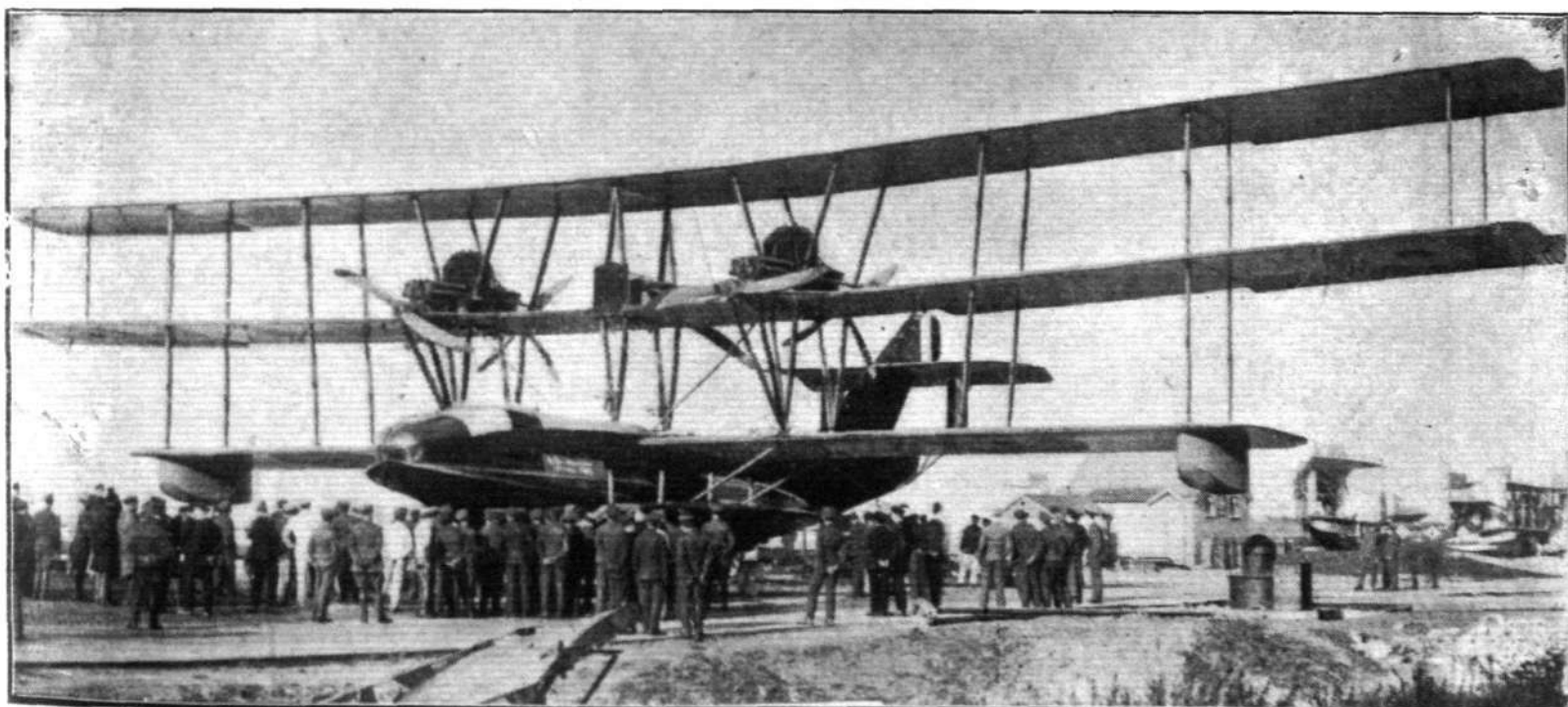
WHICH brings to mind the little controversy which is mildly raging in the Press with the object of nailing down an historical date—where the first Hun bomb from the air fell. Even then, a further distinction has arisen between the first incendiary bomb and the first explosive bomb.

BRAINTREE Urban District Council has put up a case for the first pill on February 21, 1915, but Mr. J. Chambers of King's Lynn will have none of it. He records that "on the night of January 19, 1915, at about 10.30, a Zeppelin from the direction of the North Sea passed over Hunstanton,

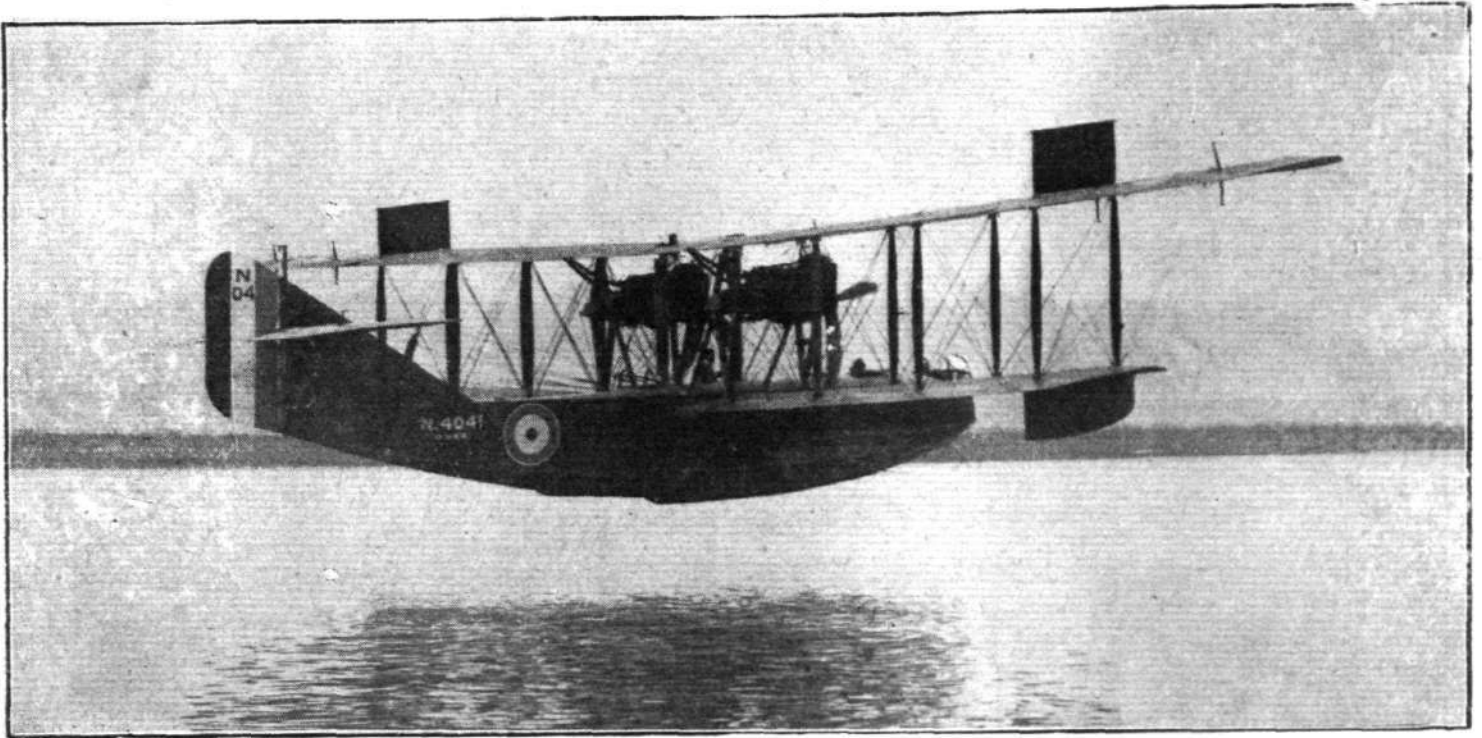
and from thence to Heacham, where it dropped an incendiary bomb, which fell into a water-butt belonging to an old lady who was outside with a lighted candle trying to ascertain the cause of the unusual noise.

"Another incendiary bomb was dropped half a mile further on in a chalk-pit. At Snettisham the airship released a very powerful explosive bomb, shattering the windows of the parish church. From that point it took almost a bee-line to King's Lynn (very plainly discernible by its bright lights), where it dropped incendiary and explosive bombs in various parts of the town."

FURTHER doubt arises per Mr. William Roberts, of Hunstanton, who alleges that Hunstanton no doubt, was the first own honoured, although this attention came from the same airship which soon after left its mark at Heacham.



FRONT VIEW OF THE PORTE SUPER-BABY TRIPLANE FLYING BOAT.—This Goliath is fitted with five Rolls-Royce "Eagle 8" engines arranged in two tandem sets and one single "pusher." Two of the rear "pusher" propellers are four-bladed, the centre rear propeller and the two tractor screws in front being two-bladed. The span is 123 ft., length of fuselage 60 ft., height, keel to ring post, 27 ft. 6 in., total weight 23,400 lbs. *British Official.*



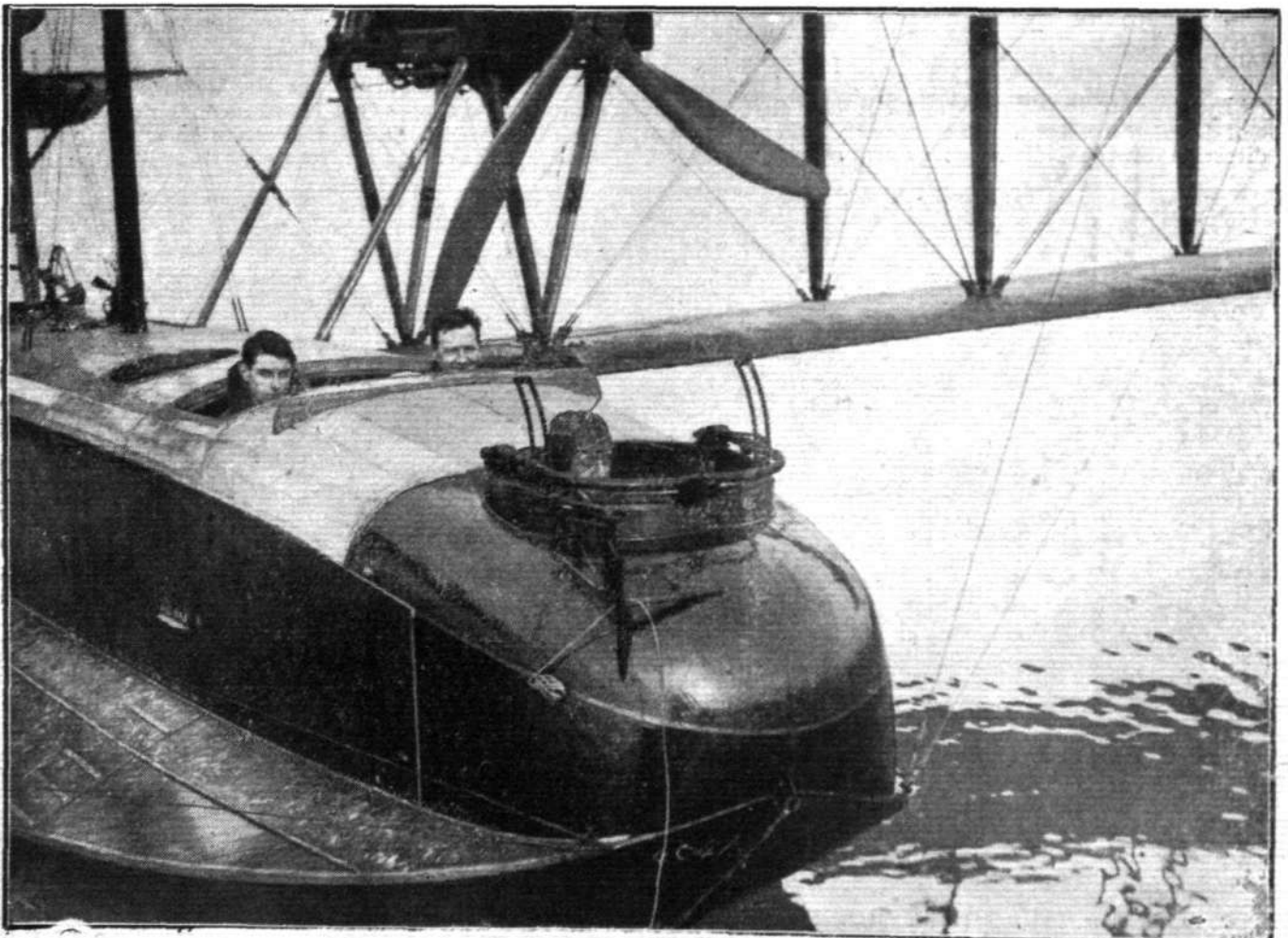
**OFF.**—A British Flying Boat setting off on its patrol over the North Sea.

THESE were probably incendiary missiles as it is from Dover that good claim is made for the reception of the first explosive bomb from an aeroplane on December 24, 1914.

MORE Departmental humour: The Board of Trade announces that no new insurances will be granted under the Government aircraft and bombardment insurance scheme after January 31. Aircraft policies which are still in force cover the risk of damage by aircraft of the Royal Air Force, and aircraft and bombardment policies cover in addition the risk of damage by the explosion of mines which drift on the coast. Risks hitherto insurable by the Government policies are now left to the open market.

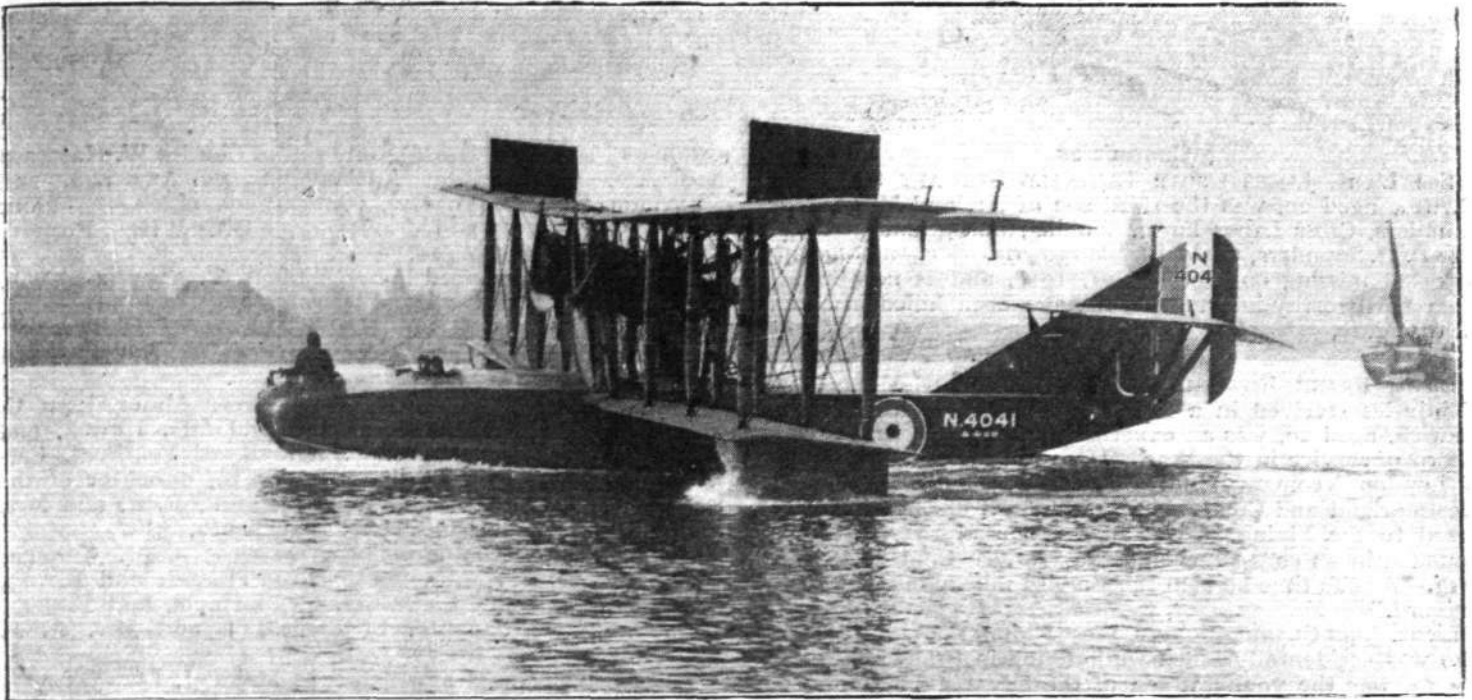
No enemy air-raids or bombardments having taken place for several months, claims for such damage as has occurred will not be considered unless already notified and unless particulars be furnished before January 31.

SOME of the aeroplanes which have recently been delivered by Germany under the armistice terms were so ricketty that, on the face of it, flying them was an impossibility. As the terms stipulated for machines to be handed over in good order, the French officer charged with taking over the spoil suggested to the German aviation officer who had brought them to camp that he should fly them personally to prove that they were in sound condition. The *argumentum ad*



**THE BUSINESS END OF A FLYING BOAT.**—The gun ring and bomb sights may be clearly seen in the nose of the boat.





OFF TO LOOK FOR FRITZ.—A British Flying Boat taxiing along the surface.

*hominum* is irresistible; the Hun thought it over for a moment, and then decided that it would be better to replace them with more air-worthy craft!

REGULAR aerial newspaper deliveries have now been established between Nancy and Metz, and the latter long-beleaguered town now receives daily six thousand copies of the *Matin*. One can imagine how delightedly these are read.

OUR French contemporary, *L'Auto*, has opened a subscription list, donations being limited to fifty francs, in order to buy a gold cigarette case for the popular pilot, Renée Fonck. From the growing length of the list it would seem that he will be forced to have a special pocket made to hold it!

THE next annual tournament—the 36th—is to be held in London from May 15 to May 31, 1919, and it will be for the Royal Navy, Army and Royal Air Force.



#### Gifts to Canada.

At Hendon, on January 21, Major-General Seely, Under-Secretary for Air, formally presented to Sir George Perley, High Commissioner for Canada, representing the Canadian Government, three aeroplanes, "Leicester," "Huddersfield," and "City of Glasgow," to take the place of those presented to Canada through the Imperial Air Fleet Committee by those three cities. The Duchess of Devonshire attached a

mascot to the "Leicester," and Lady Desborough and Lady Perley affixed similar mascots to the "Huddersfield" and "City of Glasgow" respectively. The Duchess also presented the Imperial Air Fleet Canadian flag "Leicester" to Captain McLaren, D.S.O., M.C., D.F.C., the I.A.F. Canadian flag "Huddersfield" to Major Carter, and the I.A.F. Canadian flag "City of Glasgow" to Major A. E. McKeever, D.S.O., M.C.



The formal presentation of the Leicester, Huddersfield and Glasgow aeroplanes to Canada at Hendon on January 21. Her Grace the Duchess of Devonshire presents the Huddersfield flag to Major Carter.

# Personals

## Casualties

Sec. Lieut. JAMES OSCAR REGINALD STEWART SAUNDERS, R.A.F., aged 20, was the third son of Mr. and Mrs. George Saunders, Cross Lanes Farm, Woking, and grandson of the late D. H. Saunders, Craighill, Blairgowrie. He was officially reported missing on October 21, 1918, and is now known from trustworthy information to have been killed in action on that date.

Lieut. FRANK EDWARD BARKER, R.A.F., who has died of injuries received in a flying accident at Holbrook, near Ipswich, aged 29, was an experienced pilot, and held a good record of service in the War. He served first with the City of London Yeomanry in Egypt, then as an officer in the Westmorland and Cumberland Yeomanry, and finally transferred to the Flying Service in September, 1917. He was wounded in an engagement on the Western front in August, 1917. At one time he held the English mile amateur skating "record."

Lieut. JOHN CLARKE-MORRIS, West Riding Regt. and R.A.F., who was accidentally killed while flying in France on January 13, was the youngest son of the late Dr. Clarke-Morris and Mrs. Clarke-Morris, of 67c, Shooters Hill Road, Blackheath, S.E.

Lieut. PETTER ROBERTSON, 1st Cameron Highlanders, attached R.A.F., who was accidentally killed while flying in Lincolnshire on January 16, was the younger son of Mr. and Mrs. Robertson, "Dormie," Bidston Road, Birkenhead.

## Married

Lieut. MONTAGU REANEY CHIDSON, R.G.A., R.A.F., only son of Mr. and Mrs. H. A. Chidson, of London, was married on January 9 at the English Church, The Hague, to MARIE JOSEPHINE (BETTY) DE BRUYN, only daughter of Monsieur and Madame G. A. L. M. E. de Bruyn, of Rotterdam.

Surgeon-Commander CHARLES E. CORTIS-STANFORD, D.S.O., R.N., attached R.A.F., was married on January 11, at St. James', Piccadilly, to HAZEL SHAKESPEAR, only daughter of the late FRANCIS W. MORGAN, Esq.

Brig.-Gen. HENRY MORE, R.A.F., second son of the late Mr. R. Jasper More, M.P., of Linley, Shropshire, and Mrs. More, of Rhadley, Shrewsbury, was married on January 16, at St. Peter's, Eaton Square, to PHYLLIS BLANCHE, younger daughter of the Hon. FRANK and Mrs. PARKER, of Wilton House, Eaton Square.

Lieut. R. C. SCHOLEFIELD, R.A.F., was married on January 15, at St. Thomas' Church, Winchester, to DOROTHY HELEN, daughter of C. R. SEYMOUR, Bereweek House, Winchester.

Capt. O. L. VETTER, R.A.F., was married on January 10, at St. Andrew's, Wells Street, London, to Sister EDITH EVELYN HOUGH, 14th Australian Hospital, Egypt, daughter of the late CHRISTOPHER JAMES HOUGH, of Perth, West Australia.

Lieut. D. J. GORDON WEBB, R.A.F., youngest son of Mr. C. C. and Mrs. Webb, Kilmore, Nenagh, was married on December 23 at Castletown Church, to CORNELIA MARY, eldest daughter of the late A. H. and Mrs. MILLS, Curraghbawn, Nenagh.

## To be Married

The engagement is announced between Major C. S. DUFFUS, O.B.E., M.C., R.A.F., only son of Mr. and Mrs. Duffus, Blackheath Park, London, and EVELYN URSULA, only daughter of Major G. D. MILES, R.F.A. (T.), and Mrs. Giles, Douglas Lodge, Newmarket, and Torburgh, Brora, Sutherlandshire, N.B.

The engagement is announced between Lieut. C. V. HALFORD-THOMPSON, R.A.F., son of the late Col. Halford-Thompson and of Mrs. Halford-Thompson, of Tavistock, and SOPHY, younger daughter of Mr. H. P. FREDERICK, of Burgh Castle.

The engagement is announced between Capt. F. NEVILLE HALSTED, D.S.C., D.F.C., R.A.F., only son of Mrs. Halsted, Edenholme, Reigate, Surrey, and MARJORIE, elder daughter of Mr. and Mrs. R. G. HEATON, Northaw, House Northaw, Hertfordshire, and granddaughter of the late Capt. Henry Heaton, of Worsley, Lancs.

The engagement is announced between Major I. H. B. HARTFORD, A.F.C., R.A.F., third son of the late Dr. H. W. Hartford, of Christchurch, Hants. and DOROTHEA RAMSAY, widow of Capt. H. I. St. J. HARTFORD, Cheshire Regt.

The engagement is announced between Capt. CEDRIC

CHARLES HAYWARD, R.A.F., only son of Charles W. Hayward and Mrs. Hayward, of Adelaide, South Australia, and BEATRICE ELAINE (TOMMY), youngest daughter of FRANK PEGLER, J.P., Notts, and Mrs. Pegler, of Ordsall Hall, Retford, and Seacroft, Lincolnshire.

The marriage arranged between Lieut. T. ARTHUR HERON, R.N.V.R., R.A.F., son of Mrs. Heron, of 34, Northdale Road, Frizinghall, Bradford, and HILDA BATEY, daughter of J. Batey, of Heaton, Newcastle-upon-Tyne, will take place on February 12, 1919.

The engagement is announced between Major JOHN G. HOWELL, M.C., R.A.F., son of Mr. and Mrs. Howell, and grandson of Lieut.-Col. W. P. Howell, of Penrhodl, Carmarthenshire, South Wales, to JESSIE E., daughter of the late Deputy-Inspector-Gen. T. J. PRESTON, R.N., and Mrs. Preston, of 16, St. John's Park, Blackheath, S.E.

An engagement is announced between Capt. CHARLES FREDERICK HOYLE, M.C., South Notts Hussars and R.A.F., only son of the late Lieut.-Col. C. F. Hoyle, and PHYLLIS MARION, second daughter of Lieut.-Col. and Mrs. A. F. MULLINER.

The engagement is announced of Major J. LEE JACKSON, M.C., Connaught Rangers and R.A.F., eldest son of B. Lee Jackson, of Exeter, South Devon, and Belmullet, Ireland, and Miss ROSAMOND TUDER SLADE, of Boston, Mass., and Quebec.

An engagement is announced between Major the Hon. MICHAEL KNATCHBULL-HUGESSEN, M.C., R.A. and R.A.F., only son of Lord and Lady Brabourne, and Lady DOREEN BROWNE, youngest daughter of the Marquess and Marchioness of Sligo.

The engagement is announced of Capt. IAN McEWEN, 2nd Seaforth Highlanders and R.A.F., only son of John Forrester McEwen, of Villa Razzolini, Florence, and AMETHE, daughter of the late Donald SMEATON, C.S.I., M.P., and of Mrs. Smeaton, of Lawbrook, Gomshall, Surrey.

An engagement is announced between Mr. AUSTIN E. NEAL, late lieutenant R.A.F., son of the late Thomas Neal, of Spondon, Derby, and NORA WINIFRED, younger daughter of the late Daniel John SYMONDS, of Symondsbury, and Mrs. Symonds, of Upwey, Dorset.

The marriage between Mr. MARK PATRICK, 16th Lancers, and Miss MARY MULLINER will take place at St. James's, Piccadilly, at 2 o'clock on the afternoon of February 6.

The engagement is announced between Lieut. F. HARTLEY POSTLETHWAITE, R.A.F., son of the late G. F. Postlethwaite, of Pelham Manor, New York, and ELIZABETH JULIA (BETTY), elder daughter of Mr. and Mrs. A. W. SHALLOW, of Pahar, Loughton, and Calcutta.

The engagement is announced of Mr. J. G. PRESTWICH, A.S.C. and R.A.F., second son of Mr. and Mrs. James Prestwich, of Bank House, Lytham, Lancs., and HELEN, elder daughter of Mr. and Mrs. R. H. KAY, of West Bank, Lytham.

The engagement is announced between Capt. F. B. RANSFORD, London Regt. and R.A.F., youngest son of the late Canon R. B. Ransford and Mrs. Ransford, and ESME, youngest daughter of Mr. and Mrs. J. P. McINTYRE.

## Items

Major-Gen. Sir W. S. BRANCKER vacated his appointment at the Air Ministry on January 12. His private address will be Mayfair Chambers, 13, Little Grosvenor Street, W.

The Marquis of LONDONDERRY, who is to represent the Air Ministry in the House of Lords, sat, as Viscount Castle-reagh, in the House of Commons from 1906 till the death of his father in 1915. From Sandhurst he went to the Royal Horse Guards, in which he holds the rank of major. He has been mentioned twice in despatches for his services in the War, in which he has acted as A.D.C. to Sir W. Pulteney.

Lieut. ARCHIE T. SHELDRAKE, flying S.E. 5b 7900 machine, reported missing on September 28, 1918, was last seen to land in the enemy lines, apparently under control, while attacking a German balloon east of Cambrai, and it is thought that he may have been taken prisoner. Any information will be gratefully received by Mr. Charles H. Sheldrake, Moniavie, Airdrie, Lanarkshire.

The will of Lieut. JOHN McDONALD BRADLEY, R.A.F., of Dublin, killed, has been proved at £3,818.

The will of Lieut. RALPH EUSTACE SMITH, attached R.F.C., Northumberland Fusiliers, of Eardwick Hall, Northumberland, wire rope manufacturer, has been proved at £11,764.



# THE ROYAL AIR FORCE

London Gazette, January 14.

The following temporary appointments are made:—  
**Brigade Commander.**—Maj.-Gen. J. F. A. Higgins, D.S.O., and to be graded for purposes of pay as Brig.-Gen. whilst so employed; Jan. 4.

**Staff Officers, 1st Class.**—(Air.) The date of appointment of Capt. (actg. Lieut.-Col.) T. E. Longridge is April 1, 1918, and not as stated on p. 8901 of *Gazette*, July 26, 1918. (Q.) E. P. A. Melville (Maj. in Army), and is granted a temp. commn. as Maj., and to be actg. Lieut.-Col. whilst so employed; April 1, 1918 (substituted for notification on p. 5365 of *Gazette*, May 3, 1918).

**Staff Officer, 2nd Class (Higher Grade).**—(Air) Maj. (Hon. Col.) Sir W. R. Lawrence, Bt., G.C.I.F., G.C.V.O., C.B.; July 4, 1918, to Dec. 1, 1918.

**Staff Officer, 3rd Class.**—(Q.) Lieut. C. A. Borrett, and to be actg. Capt. whilst so employed; Oct. 14, 1918.

**Staff Officers, 4th Class (2nd Grade).**—And to be actg. Lieuts. whilst so employed, if not already holding that rank:—Lieut. R. B. Fricker, Sec. Lieut. E. O. Johnson, Lieut. C. T. S. Mendl; Aug. 21, 1918. Lieut. E. A. de Spain; Aug. 25, 1918. Lieut. J. D. S. Denholm, Lieut. L. B. Goodyer; Aug. 27, 1918. Lieut. F. S. Potts, Lieut. R. V. Tivy; Sept. 13, 1918. Lieut. P. H. Austin, Sec. Lieut. V. Lowe; Sept. 20, 1918. Sec. Lieut. (actg. Lieut.) P. Gent; Oct. 5, 1918.

## Flying Branch.

Capt. C. H. Stocks to be actg. Maj. while employed as Maj. (A.); Oct. 16, 1918.

Capt. H. L. Nunn, D.S.C., to be graded for pay as Capt. while employed as Capt. (S.); April 1, 1918.

Lieut. R. P. M. Whitham, M.C., to be actg. Capt. while employed as Capt. (A.); July 18, 1918.

The following Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed in their ranks as Sec. Lieuts. (O.):—J. T. White; April 4, 1918. F. Bower; April 7, 1918. W. Rowley-Redwood, A. H. Mitchener; April 12, 1918. D. A. Cox; May 13, 1918. T. D. Raby; May 14, 1918. G. A. Allenby; A. P. Williams; May 20, 1918. J. G. B. MacMillan; May 28, 1918.

T. S. Campbell (Lieut., W. York R., S.R.) is granted a temp. commn. as Sec. Lieut. (O.), and to be Hon. Lieut.; Nov. 8, 1918 (substituted for notification in *Gazette* Dec. 10, 1918).

The following are transf'd. to unemployed list:—Lieut. A. E. Smith, D.F.C.; Dec. 29, 1918. Lieut. (Hon. Capt.) C. T. Sanctuary (R.H. and R.F.A.); Dec. 31, 1918. Capt. N. A. Bolton, Lieut. H. J. Buchanan Wollaston (Dor. Yeo., T.F.), Lieut. A. C. G. Menzies, Sec. Lieut. G. H. Powe; Jan. 1. Sec. Lieut. (Hon. Lieut.) R. L. R. Gale; Jan. 2. Lieut. H. V. Quick, Capt. H. J. T. Saint, D.S.C.; Jan. 3. Sec. Lieut. L. Springett, Sec. Lieut. D. A. Thomson; Jan. 6. Sec. Lieut. (Hon. Lieut.) W. V. Trubshawe; Jan. 11.

Capt. H. P. Watson relinquishes his commn.; Jan. 7.

Capt. H. J. Welch relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Jan. 15.

The following Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—W. Armit (contracted on active service), H. L. Bluck, W. A. Curtis, J. A. Nolan, A. J. O'Byrne (caused by wounds), J. L. Youngusband (contracted on active service); Jan. 15.

Sec. Lieut. (actg. Lieut.) M. Poole-Connor relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain the rank of Lieut.; Jan. 15.

The following relinquish their commns. on account of ill-health:—Lieut. W. Grossmith, Capt. B. H. E. Howard, M.C. (Manch. R.); Jan. 15.

Lieut. J. J. Carroll resigns his commn.; Jan. 15.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—C. Brooke, A. E. Brown, E. J. Corbett (contracted on active service), A. S. Helmer, F. T. Mollard, T. A. Scowcroft (contracted on active service); Jan. 15.

The following Sec. Lieuts. relinquish their commns. on account of ill-health:—C. G. Mobbs (North'n R.), J. M. Robertson (High. L.I.) (contracted on active service); Jan. 15.

The number of 100251 Flt. Cdt. J. L. Fisher is as now described, and not as stated in *Gazette* Nov. 15, 1918.

The number and Christian names of 800529 Flt. Cdt. Frank Eric Birkett are as now described, and not as stated in *Gazette* Dec. 10, 1918.

The notifications in *Gazette* Dec. 24, 1918, concerning Sec. Lieuts. R. C. E. Verne and E. F. Murphy are cancelled.

The notification in *Gazette* July 5, 1918, concerning Flt. Cdt. T. J. Leighs is cancelled.

## Administrative Branch.

Lieuts. (A.) to be Lieuts.:—P. W. Sim; Nov. 7, 1918. G. Walker; Nov. 18, 1918. W. C. Stewart; Nov. 25, 1918. A. Chapman; Dec. 30, 1918.

Lieuts. (O.) to be Lieuts.:—T. C. F. Paice; Oct. 9, 1918. J. K. Fisher; Oct. 22, 1918. M. J. Dalton; Dec. 14, 1918.

C. A. Borrett (Lieut., R.H.A., T.F.) is granted a temp. commn. as Lieut.; Sept. 9, 1918, seniority April 1, 1918.

Sec. Lieut. T. A. Rowland to be actg. Lieut. whilst specially employed; Oct. 11, 1918.

Sec. Lieuts. to be actg. Lieuts. whilst employed as Lieuts.:—C. E. Beeson; Sept. 16, 1918. E. L. Reynolds, from (T.); Dec. 6, 1918.

The following are transf'd. to unempld. list:—Lieut. J. More (R. Sco. Fus.); Dec. 31, 1918. Capt. (actg. Maj.) H. Waddington; Jan. 1. Lieut. H. H. Wrong (Oxf. and Bucks L.I., T.F.); Jan. 2. Lieut. F. Morton-Smith; Jan. 3. Maj. C. M. Hay, Lieut. G. H. Leonard, Sec. Lieut. H. J. Mordaunt; Jan. 6.

The following relinquish their commns. on account of ill-health:—Maj. T. W. Best (Leic. Yeo., T.F.) (caused by wounds), Capt. (actg. Maj.) C. J. Orde (Capt., R.A.S.C.); Jan. 15.

Lieut. A. S. Batchelor relinquishes his commn. on account of ill-health, and retains his rank; Jan. 15.

Sec. Lieut. R. S. Coldrey resigns his commn. to resume medical studies, and retains his rank; Jan. 15.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—H. C. Ind, C. C. Sergeant (contracted on active service), E. Seymour (contracted on active service); Jan. 15.

Sec. Lieut. J. W. Baxter resigns his commn.; Jan. 15.

The date of appointment of Lieut. (actg. Capt.) C. F. Powell is April 27, 1918, and not as in *Gazette* July 2, 1918.

The date of appointment of Sec. Lieut. (actg. Capt.) G. P. Abbot is June 1, 1918, and not as stated in *Gazette* Sept. 27, 1918.

The date of appointment of Sec. Lieut. A. J. Corbett is Oct. 7, 1918, and not as in *Gazette* Dec. 20, 1918.

The surname of Sec. Lieut. T. A. Rowland is as now described, and not Rowlands as in *Gazette* Sept. 27, 1918.

The notifications in *Gazette* Jan. 7 concerning the following officers are cancelled:—Maj. L. L. Greig, M.V.O., Lieut. H. N. Penlington, Lieut. R. Northover.

## Technical Branch.

Capt. E. D. Dent to be Capt. (Grade A) from (A); Sept. 21, 1918.

Sec. Lieut. W. B. Close to be actg. Capt. whilst specially employed; Jan. 1.

Sec. Lieut. (Hon. Lieut.) E. A. Horan to be actg. Capt. whilst employed as Capt. (Grade B); Sept. 18, 1918.

The following are transf'd. to unemployed list:—Sec. Lieut. (actg. Lieut.) R. W. Lane, Sec. Lieut. (Hon. Lieut.) F. Ward; Jan. 1. Sec. Lieut. C. T. Keble; Jan. 2. Capt. H. F. McLoughlin, Lieut. S. G. Waime; Jan. 3. Sec. Lieut. (Hon. Lieut.) J. E. S. Long, Maj. R. R. Seward; Jan. 6. Sec. Lieut. J. Mutimer; Jan. 9. Sec. Lieut. J. Elgood, Lieut. F. J. Game; Jan. 15.

The following Capt. relinquish their commns. on account of ill-health contracted on active service:—J. D. Waddell (Welsh R., T.F.), T. I. Walker (Lond. R.); Jan. 15.

Lieut. W. S. Matthews relinquishes his commn. on account of ill-health contracted on active service and retains his rank; Jan. 15.

The following Sec. Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—W. L. Clark (caused by wounds), G. V. Vantausk (contracted on active service); Jan. 15.

Sec. Lieut. P. K. Armstrong is cashiered by sentence of Gen. Court-martial; Jan. 15.

## Physical Training Branch.

Maj. L. L. Greig, M.V.O., to be graded for purposes of pay as S.O. 2 (higher rate); June 1, 1918, to July 31, 1918.

V. C. Hollender (Capt., R. Lanc. R.) is granted a temp. commn. as Capt., with seniority from April 1, 1918, and to be Asst. Superintendent of Gymnasia; June 1, 1918.

Capt. V. C. Hollender to be actg. Maj. and graded for purposes of pay as S.O. 2 (higher rate) while employed as Comdt.; Aug. 1, 1918, to Sept. 15, 1918.

Capt. (actg. Maj.) V. C. Hollender to be Capt. while employed as Asst. Superintendent of Gymnasia, and relinquishes the actg. rank of Maj.; Sept. 14, 1918.

F. G. Sherriff (Capt., York and Lanc. R.) is granted a temp. commn. as Capt., with seniority from April 1, 1918, and to be actg. Maj. while employed as Supt. of Gymnasia, and graded for purposes of pay as S.O. 2 (2nd Grade); June 1, 1918.

To be actg. Maj. while employed as Area Superintendents of Gymnasia:—Lieut. (actg. Capt.) T. Knowles, Capt. T. B. Metcalfe, Lieut. (actg. Capt.) F. K. Moncur; June 1, 1918. Lieut. (actg. Capt.) A. H. A. Gem, M.C.; June 4, 1918.

R. Northover (Capt., Lanc. Fus.) is granted a temp. commn. as Capt., with seniority from April 1, 1918, and to be Asst. Superintendent of Gymnasia; June 1, 1918.

H. N. Penlington (Lieut., Worc. R., T.F.) is granted a temp. commn. as Lieut., with seniority from April 1, 1918, and to be actg. Capt. while employed as Capt.; June 1, 1918.

The notifications in *Gazette* Jan. 7, under Gymnastic Staff, are cancelled.

## Medical Branch.

C. G. Galpin (Temp. Capt., Ret. Pay) is granted a temp. hon. commn. as Maj.; Nov. 14, 1918.

Capt. G. Fehrsen relinquishes his commn. on ceasing to be employed, and retains his rank; Jan. 15.

## Chaplains' Branch.

Rev. C. A. B. Allen (Chap., R.N.) is granted a perm. commn. as Chaplain, with the relative rank of Capt.; Nov. 22, 1918.

The following are granted temp. commns. as Chaplains, with the relative rank of Capt.:—Rev. H. McCalman (Temp. Chap. to the Forces, 4th Class, A.C.D.); Rev. C. C. Wilson (Temp. Chap. to the Forces, 4th Class, A.C.D.); Jan. 10.

The surname of the Rev. J. R. Towers is as now described and not as stated in the *Gazette* of Nov. 26, 1918.

## Memoranda.

R. G. Millar is granted the hon. rank of Lieut.-Col.; Nov. 29, 1918.

Capt. (actg. Maj.) H. O'N. de H. Segrave relinquishes his appointment as S.O. and actg. rank of Maj.; Dec. 13, 1918.

Sec. Lieut. N. H. Manners to take rank and prec. as if his appointment as Sec. Lieut. bore date Oct. 4, 1918.

The following are transf'd. to unemployed list:—Capt. Hon. A. O. Crichton, Capt. (actg. Maj.) F. W. Newman; Jan. 1. Capt. V. W. H. Rangar, M.C. (Bucks R., T.F.); Jan. 3. Capt. (actg. Maj.) G. A. Sinclair-Hill from (S.O.); Jan. 6. Lieut. H. D. Savory (Q.O. Oxf. Hus., T.F.); Jan. 15.

Capt. J. F. Hedley relinquishes his commn. on account of ill-health and retains his rank; Jan. 15.

The notification in *Gazette* Jan. 3 concerning Capt. (actg. Lieut.-Col.) E. P. A. Melville is cancelled.

London Gazette, January 17.

The following temporary appointments are made at the Air Ministry:—

**Staff Officers, 2nd Class.**—And to be actg. Maj. while so employed:—(P.) Capt. J. H. Tyler, M.B.E.; Oct. 18, 1918. Sec. Lieut. (actg. Capt.) H. Jones; Nov. 10, 1918.

The following temporary appointments are made:—

**Staff Officer, 1st Class.**—(Q.) Lieut.-Col. A. V. Bettington, vice Lieut.-Col. R. C. Donaldson-Hudson, D.S.O.; Nov. 9, 1918, to Dec. 4, 1918.

**Staff Officer, 2nd Class (Higher Rate).**—(Air.) Maj. N. M. Martin; Dec. 30, 1918. The notification in the *Gazette* Aug. 6, 1918, concerning Capt. (actg. Maj.) C. S. Macnab is cancelled.

**Staff Officer, 3rd Class.**—(Air.) Capt. H. R. H. Prince Albert, K.G., vice Capt. F. D. Lord Doune, M.C.; Dec. 29, 1918.

**Staff Officers, 4th Class (2nd Grade).**—Lieut. E. G. Roberts; Sept. 22, 1918. Lieut. A. A. Kennedy; Nov. 28, 1918.

## Flying Branch.

Lieuts. (O.) to be Lieuts. (A.):—E. C. Kelly; May 29, 1918 (substituted for notification in *Gazette* Aug. 2, 1918). R. B. Beevor; Nov. 19, 1918.

Lieut. H. Tatton to be Lieut. (O.) from (T.); June 9, 1918.

The following are transf'd. to unemployed list:—Lieut. O. B. Howell; Jan. 1st. Sec. Lieut. W. L. F. Nuttall; Jan. 2. Sec. Lieut. L. Arnold, Sec. Lieut. A. H. E. King; Jan. 3rd. Lieut. C. W. Lambert, Lieut. D. F. Murmann, Maj. G. S. Sansom, M.C., D.F.C., Sec. Lieut. M. de V. Summers, Lieut. (actg. Capt.) J. Todd, M.C., D.F.C., Sec. Lieut. J. E. Warner, Sec. Lieut. A. T. Wiltshire; Jan. 5. Lieut. (Hon. Capt.) A. W. Merchant (Lond. R.), Lieut. H. J. H. Spreadbury; Jan. 6. Lieut. H. Entwistle; Jan. 7. Lieut. A. Russell, Lieut. R. G. Smith, Lieut. (actg. Capt.) J. H. Thompson; Jan. 8th. Lieut. K. J. Brown, Lieut. J. R. English, Sec. Lieut. E. J.

H. Wright; Jan. 9. Sec. Lieut. S. D. Sayer; Jan. 10. Sec. Lieut. J. S. Downward; Jan. 13th. Capt. P. H. Martin; Jan. 16th. Lieut. J. E. Atkinson; Jan. 18.

Lieut. (Hon. Capt.) H. Ward relinquishes his commn. on account of ill-health, and is permitted to retain the rank of Capt.; Jan. 18.

The following Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—A. G. Bewes (contracted on active service), S. G. Punnett, F. E. Robinson (contracted on active service), A. E. Ryan (contracted on active service); Jan. 18.

Lieut. G. K. Rice-Oxley (Lieut., A.S.C., S.R.) relinquishes his commn. on account of ill-health; Jan. 18.

Sec. Lieuts. to relinquish their commns. on account of ill-health, and are permitted to retain their rank:—W. C. Saville (contracted on active service), H. St. J. Smith, A. L. Stephens (contracted on active service), A. J. Willox; Jan. 18.

Sec. Lieut. L. C. D. Palmer (Sec. Lieut., R.F.A.) relinquishes his commn. on account of ill-health contracted on active service; Jan. 18.

The following are antedated in their appointments as Sec. Lieuts. (A. and S.) as stated:—J. P. Bernigaud; May 13, 1918. W. A. Spence; June 13, 1918.

Sec. Lieut. W. T. J. Hall is antedated in his appointment as Sec. Lieut. (Obs. Officer) with effect from April 26, 1918.

The date of appointment of Sec. Lieut. O. R. Schoonraad is June 28, 1918, and not as stated in *Gazette*, Dec. 6, 1918.

The surname of Sec. Lieut. J. W. M. Probert is as now described, and not Hopkins as stated in *Gazette* Nov. 19, 1918.

The surname of Sec. Lieut. H. S. Boocock is as now described, and not as stated in *Gazette*, Oct. 15, 1918.

The Christian name of Sec. Lieut. Edward Wilson is as now described, and not as in *Gazette*, Sept. 13, 1918.

The surname of Sec. Lieut. J. S. Downward is as now described and not as in *Gazette*, July 23, 1918.

## Administrative Branch.

Capt. J. W. Somers to be Capt. from (A.); Dec. 12, 1918.

Lieut. F. Pratt to be actg. Capt., and graded for purposes of pay as S.O. 3 while employed as Capt. (from K.B.); Nov. 30, 1918.

Sec. Lieut. (Hon. Capt.) W. H. P. Rees to be actg. Capt. whilst employed as Capt., from (T.); Oct. 15, 1918.

Lieuts. to be Lieuts.:—A. B. Bullock, from (A.); Sept. 16, 1918. J. M. Atkinson, from (O.); Nov. 18, 1918.

Sec. Lieuts. to be Sec. Lieuts., from (A.):—T. D. Drury; Aug. 28, 1918. J. H. McKenzie; Oct. 11, 1918. B. A. Ross; Oct. 22, 1918. A. N. Ryles; Oct. 25, 1918. R. A. H. Hamilton; Nov. 7, 1918. J. E. Price; Dec. 3, 1918.

Sec. Lieut. H. T. Duke to be Sec. Lieut., from (T.); Sept. 13, 1918.

Sec. Lieuts. to be Sec. Lieuts., from (O.):—H. S. G. Palmer; Sept. 17, 1918. G. F. Wilson; Oct. 12, 1918. S. G. Birch; Nov. 6, 1918. E. A. Mann; Nov. 14, 1918.

The following are transfd. to unemployed list:—Sec. Lieut. H. G. Bright, Sec. Lieut. C. H. Swan; Jan. 3. Sec. Lieut. J. W. D. Smith; Jan. 5. Capt. H. L. U. Clark Sec. Lieut. T. Goff, Sec. Lieut. V. Lowe; Jan. 6. Sec. Lieut. S. H. Horler, Sec. Lieut. (Hon. Lieut.) (actg. Maj.) T. H. McArthur; Jan. 7. Sec. Lieut. S. A. Farr, Lieut. E. W. Keep; Jan. 8. Capt. C. W. C. Hutton (Capt. Yorks. R.), Capt. E. V. Sassoon, Lieut. A. W. Todd (Capt. Cyc. Batt., E. Yorks. R., T.F.); Capt. E. H. Wilding; Jan. 9.

Lieut. T. W. Costello is removed from the Service, His Majesty having no further need for his services as an officer; Jan. 18.

Sec. Lieut. R. D. Ogden relinquishes his commn. on account of ill-health, and retains his rank; Jan. 18.

Sec. Lieut. W. J. Meager resigns his commn.; Jan. 18, 1918.

The date of appointment of Sec. Lieut. G. E. Shipp is Nov. 15, 1918, and not as in *Gazette* Jan. 7.

## Technical Branch.

Lieuts. to be Lieuts. (Grade B), from Admin.:—L. Strudwick; Nov. 6th, 1918. R. F. Sinclair; Dec. 21, 1918.

Sec. Lieuts. to be Sec. Lieuts., from Admin. (Grade A):—P. R. Williams; Nov. 17, 1918. E. Le Couteur; Nov. 22, 1918. J. Binns, J. W. Watts, J. J. Somerville, T. H. Sutherland, N. C. Clements, B. G. Fletcher; Nov. 28, 1918. W. Andrews, J. S. Begg; Dec. 11, 1918. I. F. A. Klapper; Dec. 12, 1918. H. E. Brain, S. Calam, F. G. Brooker; Dec. 17, 1918. K. C. H. Newman; Dec. 18, 1918.

Sec. Lieuts. to be Sec. Lieuts., from Admin. (Grade B):—C. McPherson; Dec. 1, 1918. C. A. Wilkin, S. R. Lewis; Dec. 9, 1918. A. S. G. Baker, E. B. McLaren, D. A. Angus; Jan. 3.

The following are transfd. to unemployed list:—Lieut. F. H. Cooke, Lieut. M. R. Grover; Jan. 2. Capt. R. M. Perks; Jan. 3. Lieut. G. H. Brown, Sec. Lieut. R. G. Fullagar, Sec. Lieut. G. G. Gilby, Capt. (actg. Maj.) J. N. D. Heenan, Sec. Lieut. (Hon. Lieut.) W. W. Henderson (Lieut., Dur. L.I., T.F. Res.), Sec. Lieut. R. E. H. Martin; Jan. 6. Capt. P. R. Callard, Capt. G. Dugdale, Sec. Lieut. P. C. Smith, Maj. C. H. Stevens; Jan. 7th. Lieut. W. A. Barnes, Capt. H. M. Beddall, Lieut. (actg. Capt.) M. F. A. Paine, Lieut. (actg. Capt.) F. W. Wright; Jan. 8. Capt. (actg. Maj.) C. M. Carington, M.C.; Jan. 10. Sec. Lieut. W. Blairman; Jan. 13.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—V. W. Lawson, G. E. Suter, Jan. 18.

Sec. Lieut. (Hon. Lieut.) W. E. Hinton (R. Lanc. R.) relinquishes his commn. on account of ill-health; Jan. 18.

The notification in *Gazette* Dec. 24, 1918, concerning Maj. S. J. L. Vincent is cancelled.

## Medical Branch.

Capt. J. A. Watson relinquishes his commn. on ceasing to be employed Jan. 14.

## Chaplains' Branch.

H. C. Eddowes (Temp. Chap. to the Forces, 4th Class, A.C.D.) is granted a temp. commn. as Chaplain, with relative rank of Capt.; Jan. 15.

## Memoranda.

Sec. Lieut. O. W. Owen to take rank and precedence as if his appointment as Sec. Lieut. bore date Oct. 25, 1918.

The following are transfd. to unemployed list:—Maj. H. Ingram (from S.O.); Jan. 1. Maj. (actg. Lieut.-Col.) C. H. Butler, D.S.O., D.S.C.; Jan. 7. Lieut. J. J. Bartlett, Capt. W. P. M. Newman; Jan. 8. Lieut. (actg. Capt.) T. Smith; Jan. 10.

Capt. E. J. Wickens relinquishes his commn. on account of ill-health, and is permitted to retain his rank; Jan. 18.

## Royal Flying Corps (Military Wing).

London Gazette Supplement, January 16.

The following appointments are made:—  
*Flying Officer*.—Temp. Sec. Lieut. (on prob.) M. Pennycock, Gen. List and to be confirmed in his rank; March 9, 1918.

*Equipment Officer, 3rd Class*.—Temp. Sec. Lieut. (on prob.) P. M. Bayer, Gen. List, and to be confirmed in his rank; Jan. 22, 1918.

London Gazette Supplement, January 19.

*Staff Captain*.—Temp. Lieut. D. N. Thomson, M.C., and to be temp. Capt. whilst so empd., from March 1 to 31, 1918.



## A Night Flight to Edinburgh

AT 3 a.m. on January 17, a Bristol fighter biplane, with Rolls-Royce engine, piloted by Major C. L. Payne, M.C., with Major C. Coe as observer, landed at Edinburgh, having flown up from London. Their actual flying time for the 400 miles was 3 hours 40 mins., but a forced descent on the way, due to petrol trouble, increased the gross time to just over five hours. Considerable wind was met on the journey, and for most of the way the bright moonlight proved helpful. At the chief aerodromes on the route flares were lighted and as the machine passed each station signal lights were fired from the machine.

## The Ipswich-India Flight

IT was announced by the Air Ministry at the end of last week that the Handley-Page biplane, fitted with Rolls-Royce engines, which left England for Karachi on December 13, had safely arrived in India. The machine was piloted by Major A. S. MacLaren, M.C., and Capt. Halley, and one of the passengers was Gen. MacEwen.

## Italy to Brazil by Air

FROM Washington comes a story that Signor Caproni has signed a contract with the Brazilian Government to carry mails between Genoa and Rio de Janeiro, and it is said to be a condition that the service to Brazil shall begin six months after the close of the War. In the meantime the American authorities are considering the feasibility of establishing an aerial mail between Washington and Rio de Janeiro.

## Sixty-three U.S. Aces

FIGURES supplied by the U.S. War Department show the names of sixty-three U.S. aviators who have accounted for five or more enemy planes. The list is headed by Capt. Edward J. Rickenbacker, who first became famous as a driver of racing cars, and is credited with having destroyed twenty-six planes.

## Aerial Mail in and from France

FROM Paris comes word that an aerial postal service between Paris and Brussels with a stop at Lille, is to begin immediately. The distance is 187 miles. It is stated that other services under contemplation are Paris-London, Marseilles-Nice, and Bordeaux-Lyons.

## Vedrine Lands on a Roof and Wins £1,000

NOW that active service flying is over for the time being, French pilots are once more thinking of the prizes which still remain to be won. Jules Vedrine on Sunday afternoon in spectacular fashion won the £1,000 prize offered to the first airman to land on the roof of the Galleries Lafayette, which is 14 metres wide by 30 metres long. There was a thick fog when he started from Issy-les-Moulineaux, but he managed to land his Caudron III safely, although it was slightly damaged before it came to rest.

## Vedrine to Fly Round the World

AFTER a night flight from Paris to Rome and back in twenty-four hours, which he proposes to make as soon as the weather is sufficiently settled, Vedrine proposes to start on a tour of the world. His idea is to tour round Africa, fly across Arabia to India, across the East Indies to Australia. From there he proposes to go to China and then across the Behring Straits to America. On his way home he intends to land at Iceland and to pay a flying visit to Great Britain. It may be recalled that five years ago he flew from Nancy to Belgrade, Constantinople, Beyrout and Jaffa.

## Flying to the Isle of Man

CAPT. ELGIE JEFFERSON, R.A.F., the first Manxman to fly from England and land on the Isle of Man, appeared over Douglas on January 11 and gave an exhibition of trick flying.

## Immelmann's Origin

IT appears from a message from Johannesburg that Immelmann, who was shot down and killed by a South African, Lieut. McCubbin, on June 18, 1916, was born at Uitenhage, Cape Colony, went to Germany to study medicine, and there renounced his British origin.



# THE REPORT OF THE CIVIL AERIAL TRANSPORT COMMITTEE

(Continued from page 27.)

## APPENDIX J.

Report by Lieut.-Col. O'Gorman, Mr. Holt Thomas, and Mr. Lanchester on a Main or Terminal Aerodrome.

**NOTE.**—This report was drawn up in answer to a request by the Special Committee for a report upon a main or terminal aerodrome suitable for despatching and receiving 100 aeroplanes a day, with sufficient housing accommodation for a similar number.

## A Main or Terminal Aerodrome.

We do not consider that it is possible to make any constructive report on this subject on the lines of 100 aeroplanes leaving and arriving per day and housing for 100 craft.

1. *Expenditure.*—The cost of terminal aerodromes is by no means so easily approximated to as that of intermediate grounds, for the reason that they will necessarily be at least on the outskirts of large centres of population. It is accordingly impossible to make any estimate of what expenditure might be involved. (It may be possible to discover what is the approximate ground-rent of Hendon Aerodrome, also its accurate acreage (approximately 200 acres), and to indicate whether such an aerodrome as this is the minimum which could be reasonably used for civil transport service in London, and whether it may be regarded as a minimum type of terminal aerodromes.)

2. *Size.*—The minimum size of an aerodrome from the point of view of the alighting of single machines, is obviously the size of the intermediate landing grounds indicated by Capt. Robb in his paragraph 2 of Appendix K, but the actual size required at any terminal station for, e.g., 100 aeroplanes "leaving and arriving" per day depends upon the number of aeroplanes which may be expected to be arriving or leaving simultaneously, and it is difficult to forecast this with any attempt at precision, since no data exists on which to found an estimate of the times of starting and arriving. If we suppose that aeroplane flying will for preference take place by daylight, then it is to be supposed that the major part of the starting will take place in the morning and the major part of the arriving will take place after noon, since on broad lines it may be said that the reasonably long flights will be economically desirable. Nevertheless, where the air service is run to districts which have not got a good railway service, it will be found that short distance air journeys can be introduced, and accordingly a certain amount of use of the aerodrome throughout the middle hours of the day for leaving and arriving is to be expected. Under the circumstances, it is impossible to discuss the problem on a basis of a definite number per diem without making some assumption for which data do not at present exist; we have therefore substituted the rate per hour and assumed 15 leavings or arrivals per hour, without expressing our opinion as to whether this corresponds to 100 per diem. It is thought that an aerodrome of about 200 acres could handle this traffic, especially if the departures were reasonably distinct from the bulk of the arrivals, but for it to do so it would be necessary to have active and well organised gangs of men to arrange to clear the aerodrome of machines which may stop in an exposed position, and thus leave the aerodrome free for other machines. Compulsory powers of purchase or hiring in default of agreement will no doubt be necessary in some centres.

3. *Surface.*—In view of the extreme importance to be attached to high wing loading and rapid alighting, for the purpose of economy in aircraft construction and use, the surface of the aerodrome would have to be very much superior to that at present existing at Hendon, without actually pressing it to the point of being as level as an ordinary cricket field. Beyond that it would be imperative that all high buildings, high edges, and high trees in the immediate neighbourhood should as far as possible be avoided.

4. *Soil.*—It is clear from experience up to date of aerodromes, which are frequently on flat, low-lying land, that drainage would be required. Moreover, on a certain expanse in front of the sheds proposed, there should be tar macadam or other waterproof inexpensive flooring.

5. *Approaches.*—These should be similar to those mentioned in paragraphs 5 of Appendix K.

6. *Surrounding Country.*—See Appendix K, paragraph 6.

7. *Preparations.*—See Appendix K, paragraph 7, save that since the terminal grounds will be larger they will be proportionately more costly.

8. *Accommodation.*—The housing for, say, 100 aeroplanes would necessarily involve petrol and oil stores, repair departments, standing buildings for ground-men, offices, store for the reception and delivery of goods, and, later, station room, perhaps, for passengers, garages for attendant motor cars to convey the service to town centres, offices for inspectors and traffic chiefs, &c., and aeroplane sheds so built as to admit the largest probable aeroplanes. At the inception of the service on a small scale this expense could no doubt be deferred or minimised.

9. *Marking.*—It is probable that no specific marking will be required for terminal landing grounds, because their character will be so very obvious to fliers who are approaching the centre for which they are making, but arrangements for such devices as kite balloons for signalling the situation in time of fog, wireless appliances and meteorological observatory should be foreseen.

10. *Lighting.*—Paragraph 11 re lighting in Appendix K would also apply here.

11. *Maintenance.*—See paragraph 12 of Appendix K.

The installation of housing for 100 aeroplanes on transport work at the termini is clearly dependent upon a future state of civil aerial transport, and need not be at once instituted as a charge upon the nascent industry. Such charge could only be borne if alternative military and naval use of the facilities were to form a means of distributing the burden of the cost on other shoulders than the transit company's. The eventual need of such housing no doubt exists, but the cost of such housing will be so largely dependent on the size of aeroplanes used that an estimate would be unavoidably misleading and would differ at one terminal station from what it would be at another where smaller craft might be the main types.

October 23rd, 1917.

## APPENDIX K.

Memorandum by Major E. Elvey Robb as to Intermediate Landing Grounds.

1. *Distance apart.*—Mr. Holt Thomas, in his recent lecture before the Aeronautical Society, suggested that the distance between each landing ground on an aerial route should be 10 miles, and at the inception of civil aerial transport the provision of landing grounds on this scale would appear essential in order to minimise risk of accident. Some economy might be effected by providing a regular landing ground with attendance and accommodation every 20 miles with facilities for forced landings midway between every two landing grounds. These facilities for forced landings on emergency grounds could be arranged by carrying out a limited amount of work in the way of removing hedges, felling trees, &c. Emergency grounds would only be used in case of absolute necessity.

2. *Size.*—Each landing ground should afford a clear run of 600 yards in every direction. If any serious obstacles exist on the approaches to the

ground, the size of the ground may have to be increased. It is not essential to have a ground 600 yards square. An "L" shaped ground will suffice if it affords a clear run of 600 yards in any direction, provided each arm of the "L" is at least 300 yards wide. The area of landing grounds on this basis will average 60 acres.

3. *Surface.*—The surface should be level so that machines can normally land upon and taxi across the ground without injury.

4. *Soil.*—Selection will naturally be confined to the line of the aerial route, but subject to this, landing grounds should, as far as practicable, be chosen on light, porous soil with natural drainage. Grounds with clay soil invariably require special drainage.

5. *Approaches.*—The approaches—or, at all events, the majority of the approaches—should be open and free from serious obstacles. It will frequently be necessary to fell trees, remove haystacks, &c., on adjoining grounds, and telephone and telegraph wires on roads bounding landing grounds will have to be lowered or carried underground. Statutory powers for those purposes will be required.

6. *Surrounding country.*—This should afford facilities for forced landings in case of engine failure when "taking off."

7. *Preparations.*—This will consist mainly of grubbing hedges, piping, and filling in or boarding over ditches and watercourses, levelling, tree-felling, etc. The cost of preparation will naturally vary according to the nature of the site and the amount of work involved. An average expenditure of £1,500 will cover the cost of preparing landing grounds. Compensation payable to the owner and occupier for disturbance (other than to crops) will average £500 per ground, making a total of £2,000 per ground. The cost of preparing "emergency grounds" will average £750 per ground, and £350 per ground should cover compensation (other than crops)—£1,100 per ground in all. Statutory powers authorising the necessary work of preparation in default of agreement, and prescribing a method of ascertaining the compensation will be necessary.

8. *Accommodation.*—At intermediate landing grounds not used for the reception of passengers or freight, and where no provision for carrying out serious repairs is contemplated, the only accommodation required for landing purposes will be:—

(a) Attendant's hut with exchange telephone connection;

(b) Small store for petrol and oil.

This accommodation can be provided for the average cost of £400, which includes provision for telephone connection, which will be a serious item in some districts.

9. *Cost of hire.*—This will average £1 per acre per annum throughout Great Britain. To this figure must be added, for the first year in the case of arable, £4 per acre, and in the case of pasture, £1 per acre for tenant right and disturbance of crops. These figures are additional to the compensation estimated in paragraph 7. This estimate is based on actual experience with military landing grounds, and it should be stated that the figures referred to have only been arrived at by careful management. Grazing has been permitted subject to the restrictions mentioned below, and certain grounds have been put out of action during the months of May and June to enable them to be laid down to hay. In some cases, grounds managed on these lines, have shown a small profit and this has brought down the average cost to the figure mentioned. How far it would be possible to deal with landing grounds on an aerial route in this manner is a doubtful question. Grazing on landing grounds is a matter that requires very close attention, and it is necessary to pen the stock or place it under the control of a shepherd or dog. Experience has shown that in the daytime sheep only should be permitted to graze on landing grounds of which any extensive use is made. On grounds which are not in use during the night, stock of all descriptions can be grazed from dusk to dawn. If no arrangements for grazing or laying down to hay are permissible, the estimated cost of hire would be £1 10s. per acre. Compulsory powers for purchase or hiring in default of agreement will be necessary.

10. *Marking.*—It is difficult from the air to distinguish landing grounds from the surrounding country, and they, therefore, require marking in a distinctive manner. A chalk circle 100 ft. in diameter and with a band 3 ft. wide, has proved very effective, and can be seen from practically any attainable height on a clear day. It is necessary to keep the sign a good white colour so that it stands out well, and this is done by lime-washing the chalk from time to time. The name of the ground should also be marked in chalk letters 15 ft. long by 3 ft. wide. Emergency grounds should have a distinctive sign to distinguish them from regular landing grounds.

11. *Lighting.*—Numerous experiments in methods of lighting landing grounds have been tried. The result of a large amount of experience in night flying is that pilots prefer simple methods. A number of paraffin or petrol flares, arranged in such a manner as to indicate the existence of a landing ground and to illuminate the landing area, has proved the most effective method. The position or number of the flares can be varied in a similar manner so as to indicate to a pilot the locality of the ground. In some cases, it is necessary to indicate obstacles on the approaches to and exits from landing grounds by red lamps.

There are various minor details in connection with the lighting of landing grounds which require consideration, as to which detailed information can be given if required. The above particulars will, however, suffice to show that in the ordinary way the lighting of these grounds is a simple and relatively inexpensive matter.

12. *Maintenance of Landing Grounds.*—The grass requires cutting or grazing and the ground rolling from time to time.

13. *Summary of estimated expenditure on preparation and hiring.*

(a) Landing grounds (average, 60 acres).—

	Arable.	Pasture.
Preparation .. .. .	1,500	1,500
Accommodation (including telephone connection) ..	400	400
Compensation (other than crops) .. .. .	500	500
Compensation for crops .. .. .	240	60
	<b>£2,640</b>	<b>£2,460</b>

(b) Emergency grounds.—

Preparation .. .. .	750	750
Compensation (other than crops) .. .. .	350	350
Compensation for crops .. .. .	240	60
	<b>£1,340</b>	<b>£1,160</b>

Hiring: This will average £60 per annum in each case, or, if no grazing or laying down to hay is permitted, £90 per annum.

August 23rd, 1917.

### APPENDIX III.

#### Final Report of Special Committee No. 2.

Special Committee No. 2 submit the following report, dealing, as far as appears possible at present, with those matters referred to them which are not covered by their Interim Report.

#### Aerial Transport of Passengers and Goods.

In considering the practical possibilities of aerial transport generally, the Special Committee, in their interim report, dealt more particularly (see page 43) with air mail services. In their present report the Committee propose to deal with the carriage of passengers and goods, including the question of the probability or otherwise of the use of privately-owned aircraft.

As to the types of machines which are likely to be used in commercial services, the Committee desire to emphasise one aspect of the technical reports of Col. O'Gorman and Mr. Bairstow, which are appended to their interim report as Appendices A and C. These reports were furnished in answer to a request by the Committee that four widely different types of aeroplane now in military use should form the basis of a report as to the limits of the capacity of aeroplanes generally. The four types were selected so as to cover the whole range of existing machines, and the estimates given of the performances to be expected are illustrative of the possibilities of aeroplanes generally. Thus, the data set forth in these reports can be used as a basis for estimating the performance of the commercial aeroplane in the immediate post-War period. The variations in design which commercial services will render necessary are only of a secondary character. There is no difficulty in adapting aeroplanes to the carriage of passengers and goods, as well as of letter mails. The case is different with airships. As far as airships are concerned, it will be observed from the report by Wing Capt. Maitland, which is attached hereto as Appendix A, that while the existing types, which possess a very large proportion of disposable lift, may be expected to prove, within limits, suitable for commercial work, far better results could be obtained by specially designed airships, as the lines of development, up to the present, which have been purely military, have not been such as to produce the most suitable airship for commercial purposes.

Generally speaking, the Committee are of opinion that the carriage in aircraft of mails, passengers, and goods will present no difficulty from the technical point of view. It would appear from their terms of reference, which mention the question of running costs, that the Committee were expected to attempt some forecast of the probabilities of the commercial success of such carriage. This has proved practically impossible from the lack of any experience of commercial aerial transport up to the present time. The amount of business over which a civil aerial transport company would have to spread its standing charges is therefore a matter of uncertainty. Moreover, in the absence of any reliable forecast of the amount of business over which aircraft manufacturers after the War will have to spread their standing charges, the prime cost after the War of the machines, upon which the cost of using them must largely depend, cannot be even approximately estimated. The Committee feel that they are safe in saying that, given a demand for the carriage of mails, passengers, and goods, there are no practical obstacles in the way of organising aerial services to meet that demand. The Committee would again point out that, in initiating aerial transport services, due advantage should be taken of the novel facilities offered by the use of aircraft, e.g.,

- (1) In the case of mails, by competing with telegraphic services or in establishing a new type of express letter service;
- (2) In the case of passengers, by competing with rail, marine, and road services over long distances, or where the journey either includes sea as well as land passages, or is between places not conveniently served by rail.
- (3) In the case of goods, by enabling ordinary merchandise, commercial samples, and even (if necessary) spare parts of machinery urgently required, to be conveyed quickly to places otherwise inaccessible except by journeys involving great expenditure of time.

While it is quite possible that the earlier commercial use of aircraft will take the form of regular services, particularly in the case of letter mails, the Committee suggest that one of the first methods of employing aeroplanes for the transport of passengers may lie not in the flying of craft between cities at specified times, but in the occasional and increasing use of single machines for rapid journeys in any direction, rather than along a fixed route, carrying one or more occupants who may be prepared, owing to the urgency of their business, to pay special fees so as to secure the high speed of transit which will be possible by air.

Such first and occasional passenger work, which might increase until it provided an appreciable but not large source of revenue, would have the advantage of educating the public as to the rapidity of aerial transit—thus preparing them for the time when regular services were started—could be undertaken immediately peace comes, since it would not be open to the same objection as would any premature attempt to run a daily service to schedule irrespective of weather conditions.

After the War, therefore, we can contemplate the systematic organisation of existing resources in the shape of aerodromes, pilots, and suitable machines, so that passenger craft, flown by skilled and reliable men, could be hired at so much per mile or day for rapid journeys. It should be possible to arrange things so that a busy man might engage a machine for a journey from London to Dublin, Paris, Stockholm, or the like by telephone from any post office or convenient public office. The wide use of such a service would depend largely on the facilities being universally known and understood, and upon its being generally accessible under standard conditions. Otherwise it might become only an occasional convenience for people with sufficient leisure to make the necessary enquiries and arrangements. The development of services of this kind in their earlier stages might provide an outlet for a certain number of surplus military machines of a type adaptable to passenger carrying.

#### Privately Owned Aircraft.

The probable use of privately owned aircraft will largely depend on the development of aeronautics as a recreation and a sport. This, again, will depend largely on the cost of the acquisition and use of aircraft. But since there will exist at the end of the War sufficient facilities in the shape of landing grounds to render flying by day free from any particular risk, although the encouragement of aeronautics, the establishment of flying clubs might be valuable. Such clubs could be either promoted by the proprietors of aerodromes, who would be in a position to offer special facilities for storing machines and providing club premises, or could be formed by associations of flyers leaving the Services at the conclusion of the War, rather in the manner of non-proprietary social or sports clubs. Such flyers might thus be enabled to make use of aeroplanes at a reasonable expense and to keep themselves in practice. These clubs might find employment for a small percentage of such machines as may be surplus to naval and military requirements, and they would tend to stimulate the design and construction of pleasure and touring type machines.

#### Aerial Routes.

The Committee have considered Item 6 of their terms of reference, viz.: What main aerial routes might be marked out and prepared for now for utilisation by an aircraft service. The Committee do not think that they can, in the light of information now available, usefully add anything to their interim report. With regard to the Atlantic route mentioned in that report,

they have made further enquiries as to the prevalence of fog on the coast of Newfoundland from Sir E. Morris, and Mr. H. C. Thompson, of the Newfoundland Railway and Train Ferry Syndicate, Ltd. The answers to these enquiries, which are attached as Appendix B, confirm the view that the fog does not as a rule rise very high above the surface of the sea, and that it does not generally extend more than a mile or two inland.

#### Aerial Mail Services.

The Committee desire to draw attention to a revised memorandum by Mr. Harper on an experimental air mail service from London to Glasgow, which is attached as Appendix C to this report. This supersedes the original memorandum (Appendix E to the interim report), and the times have been worked out on a load of 100 lbs. of mails with machines of a maximum speed of 150 m.p.h. and an average speed of 120 m.p.h.

#### Prohibited Areas.

With regard to prohibited areas, and any regulations which should be made for their protection, the Special Committee are of opinion that these are matters the consideration of which should be deferred until after the War.

#### Night Flying.

Since the problems of night flying are at present under investigation, and the methods of ensuring safety in this kind of flying will be the subject of rapid development, the Special Committee do not put forward detailed recommendations, but they present the following summarised conclusions:—

- (1) Night flying will be valuable from the commercial point of view.
- (2) Improvements in the methods of illuminating landing grounds, both on the ground and from machines themselves, should be sought for.
- (3) The illumination of aerial routes as an aid to navigation (apart from landing facilities) is desirable.
- (4) The development of directional wireless is of the highest importance.

#### ANNEX C. OF THE DRAFT INTERNATIONAL CONVENTION.

This Annex was referred to the Committee by Special Committee No. 1. It contains such regulations as to lighting of aircraft, rules of the air, and rules as to landing and distress signals as were agreed to by the delegates of the various European Powers attending the Paris Conference in 1910. Recent developments in aeronautical science and practice renders necessary certain modifications of these regulations, more particularly because at the time of the Paris Conference the proposed regulations were considered more from the aspect of the use of airships than of aeroplanes. The detailed recommendations of the Special Committee have been incorporated in Appendix A to the Report of Special Committee No. 1.

R. M. Ruck, Maj.-Gen. (Chairman), Leonard Bairstow, \*R. M. Groves, Wing Capt., R.N., G. Holt Thomas, E. M. Maitland, Wing Capt., R.N., E. P. Morris, G. E. P. Murray, \*Mervyn O'Gorman, Lieut.-Col., Frank Pick, J. C. Porte, Wing Comdr., R.N., J. W. Pringle, Col., E. Elvey Robb, Capt., W. P. Schreiner, W. Sempill, Wing Comdr., R.N., T. Vincent Smith, Maj., T. Sopwith, G. I. Taylor, Maj., E. R. Wayland, Lieut.-Col., H. G. Wells, H. White Smith.

D. O. MALCOLM (Secretary).

January 21st, 1918.

#### APPENDIX A.

##### The Airship for Commercial Purposes.

In attempting to form an opinion of the capabilities of airships and aeroplanes respectively as commercial vehicles, it is important to bear in mind certain phases of past history.

In the first place, the design and construction of airships has up to the present in all countries been mainly confined to the Services, and where private firms have been concerned they have been engaged on producing airships suitable for military purposes. In taking airship performances during the war as a standard of future commercial development it should, therefore, be remembered how vastly different are the requirements of commercial and passenger carrying airships to those which have hitherto been paramount in the minds of constructors. The modern Zeppelin, for instance, is designed for rapidity of climb, the attainment of great heights, and the carrying of large quantities of bombs, speed being a secondary consideration.

In a commercial airship increased speed will be necessary if a regular service is to be maintained, while a height of 1,000 ft. will be ample for normal flying, though greater heights should be attainable if necessary. The weight-lifting feature would be retained for the carrying of goods and passengers.

Existing German military airships have proved themselves capable of attaining a maximum speed of over 60 m.p.h., with a "disposable lift" available for crew, fuel, bombs, etc., of over 30 tons, remaining in the air for something like 36 hours, and attaining a height when over this country of 18,000 or 19,000 ft.

There is little doubt that a commercial rigid airship could be constructed to-day with a maximum speed of 75-80 m.p.h., capable of covering 2,000 miles with a load of cargo of 12-15 tons; or 600 miles with 30 tons of cargo (or 210 passengers with 50 lbs. of luggage each).

With care in designing it should be possible to design an airship having the speed named with comparatively slight increase in engine power and of the same size as the present-day Zeppelins. The Germans, owing to the necessity for rapid output, have adopted a comparatively inefficient form, from the aerodynamic point of view, but with an airship of true stream-line form the higher speeds should be easily attainable.

The fact that a number of Zeppelins have been brought down over this country and in France does not affect the value of airships for commercial purposes, as the inflammability of the gas with which they are filled does not give rise to any danger in normal flying. In spite of the enormous amount of flying which has been carried out by airships in this country during the War, there has been no case of the destruction of one of these craft owing to its catching fire in the air.

One of the objections to airships which is frequently raised is their inability to fly in strong winds. This is in part due to the comparatively slow speeds which have been obtained up to the present, for the reasons stated above, and which can undoubtedly be improved upon with careful attention to design having that end in view. It is, however, largely due to the difficulty of handling airships on the ground in high winds owing to the large surface they offer to the wind. There is no doubt that this difficulty would be, to a considerable extent, overcome by the adoption of revolving sheds on land or floating sheds on water. The best method, however, undoubtedly, would be to abolish sheds altogether—except for docking purposes—and maintain the airships permanently moored out.

The many practical advantages which the airship possesses for commercial purposes are not, perhaps, always appreciated.

Present-day airships, which in no way approach the limit of size, as has already been pointed out, have a disposable lift of over 30 tons, which enables them to embark on long flights without the necessity of descending for replenishment of fuel.

\* Reservations by General Groves and Col. O'Gorman will be found at the end of Appendix A to the Report of Special Committee No. 1.



The initial weight of the power plant is, for the same reason, of less consequence than in the case of the aeroplane, which renders efficient silencing possible, and at the same time simplifies design owing to the weights not having to be cut down to so fine a point. There is no reason why an airship should not be fitted with engines as silent as those of a motor car. Sleeping accommodation can, in any case, be provided well away from the lower plant, and there is complete absence of such noises as the singing of wires which would detract from the comfort of passengers in an aeroplane. In this connection it may be pointed out that in this country airships have up to the present—owing to the limitations of output—necessarily been fitted with engines designed for aeroplanes. The special requirements of an airship engine are too detailed to be gone into here, but great improvements are undoubtedly obtainable by the use of such engines. An airship can remain in the air, however low the speed may be, so that the engines can be throttled down when required, thus effecting considerable economy in petrol consumption; while the fact that the engines need not necessarily be run for long periods of time at full speed has obvious advantages from the design standpoint.

The power plant can be readily split up into as many units as desired—there being no advantage in concentrating the weights—and failure in the power-plant does not involve immediate descent, while running repairs can easily be effected in the air.

Even with landing grounds only 10 miles apart an aeroplane would be compelled to fly at a minimum height of about 3,000 ft., whereas an airship can cruise with safety a few hundred feet above the ground, which considerably enhances the pleasure of passengers by affording them an opportunity of enjoying the scenery.

The difficulty which an aeroplane pilot has in judging the attitude of his machine to the horizontal at night, or in fog, mist, or cloud, does not obtain in an airship, which always remains on an even keel.

An airship can set out on long flights over the sea or marshy and wooded country without fearing engine failure. At intermediate stopping places it can come down to within a few hundred feet of the ground and moor to a grapple (or drogue if over the sea) to replenish fuel, without actually landing. Similarly, an airship can fly at night with complete safety, navigation being carried out by the ordinary naval instruments and observation of the stars made from a steady platform on the top surface.

In conclusion, the commercial airship of the not-far-distant future will have a "disposable lift" available for crew, fuel, and merchandise, or passengers of 50 to 60 tons or more. It will have a speed of 90 to 100 miles per hour, with ample accommodation for passengers in the shape of saloon, drawing-room, smoking-room and state-rooms, with a lift giving access to a roof garden on the top, and will be able to remain in the air for a week or more at a time. After a journey it will return to moorings like a water-borne ship, only being housed in a shed for periodic overhaul.

E. M. MAITLAND,  
Wing Captain.

December, 1917.

#### APPENDIX B.

*Correspondence Relating to Fog on the Newfoundland Coast.*

Copy of letter from Sir E. Morris, to Lieut.-Col. Wayland, dated January 3rd 1918.

"I am much interested in the question of fog on the coast of Newfoundland in its bearing on the question now being considered by the Civil Aerial Transport Committee. I have lived all my life in Newfoundland, and have frequently sailed in the spring, summer and autumn seasons around the coasts of the country and Labrador. Between the ages of 15 and 18 I lived at a place in Placentia Bay, probably the bay in Newfoundland having the highest percentage of fog. During these years I cruised and sailed a small pleasure yacht, and I can speak with a certain amount of personal experience. Generally speaking, Newfoundland inland or along her coasts has no fog which could correctly be designated as 'local.' Our fog comes in from the Atlantic Ocean when the winds are between North-East and South-West. There are seasons when even with a S.-W. or N.-E. wind we may not have a fog. We never by any chance have fog when the winds are from any point between S.-W. going West around to the N.-E. It follows that as our prevailing winds, sometimes continuously for months, are from the W. and N.-W., we have very little fog. I have seen a whole season from April to November pass without rain or fog. When the fog does come in from some atmospheric cause, it lies low right down on the water, and it is a common occurrence to see the sun shining on the hill-tops and fog down on the sea. So much so is this the rule that the practice is to build our lighthouses on high promontories from 500 to 600 ft. high. Further, as a rule, the fog does not penetrate inland very far, but is eaten up and absorbed by the land over which it hangs, and it is a usual and common daily occurrence to see a bank of fog outside the harbour and a glorious sunny day inside without a vestige of fog. Further, the fog is perfectly white, and although at times thick would not, I fancy, be found too dense for landing from the air, as I think it will be found that the fog does not reach the height at which airmen fly. Under all the circumstances, I think it will be found that there are no special difficulties in the way of Newfoundland being the landing station on the western side of the Atlantic for any aeroplane service after the war. Further, I think on enquiry it will not be difficult to procure evidence to support this position."

Copy of letter from Mr. H. C. Thomson to Lieut.-Col. Wayland, dated December 14th, 1917.

"In reply to your request for further information about the nature of the Newfoundland fog, I may say from my own experience that the fog does not, as a rule, rise very high above the surface of the sea. From some little way off it can often be seen lying on the sea like a regular bank of fog with clear sky above it. Sometimes, too, when it is so dense on the water's edge that one can hardly see a ship's length off, it is so thin above that the sky can just be made out. Very often, too, there is a clear belt between the fog and the land—the land, the sailors say, 'eats the fog,' and even when it closes right in on the coast, it only extends a very short distance inland. I have often seen St. John's so enveloped in fog that the harbour cannot be seen at all, whilst a mile or two inland there is bright sunshine."

"In the interior there is very little fog indeed. I write from recollection, but I think Lord Northcliffe drew attention to this in a speech he made some four or five years ago at a meeting of the Anglo-Newfoundland Development Company."

"I will try and get this for you next week. There is also a remarkably clear belt stretching across the Gulf of St. Lawrence from St. George's Bay on the west coast of Newfoundland to Chatham in New Brunswick."

"The average of fog in St. George's Bay, you will see from the lighthouse percentages I send you, is so small as to be practically negligible, and the enclosed correspondence and the statistics furnished by the Meteorological Office some years ago shows that the fog at Chatham is also exceedingly small, much less than either to the north or to the south of it."

"There are many excellent landing places round St. John's, and as it is the capital of the island it would probably be the best halting place for passengers; and the flight from there to St. George's Bay would be over the land all the way, and freer from fog than if a landing were made near Cape Race and the flight continued from there."

#### APPENDIX C.

*Revised Memorandum by the Assistant Secretary (Technical) as to an Express Air-Mail Service between London and Glasgow, via Newcastle and Edinburgh.*

It is assumed that in an experimental express service, started immediately after the War, only a limited quantity of urgent mails would be carried, at a special fee, and that the bulk of the mails would still go, as at present, by land. The service contemplated in this memorandum is a purely express service. Others will doubtless be established, such, for example, as those in which large machines will carry passengers and parcels as well as mails.

A London-Glasgow service has been chosen for illustration for several reasons. In the first place, it requires at least a 250 miles' flight, at an average, say, of 120 miles an hour, such as that from London to Newcastle, to demonstrate the speed of an express air service, and for this speed to offer a sufficiently marked saving of time over railway transit, remembering that one must reckon the time taken in establishing the land connections of an air service.

By instituting a London-Glasgow express service, and by so arranging the time-table that a business man could post an urgent letter during the morning in London or Glasgow, and for this letter to reach its destination well before the close of the business day, one would offer a facility which cannot be offered by existing means of communication; and it is argued that, when given this new facility, the business world would learn to make use of it.

The aeroplanes employed on the service are assumed to be machines which, carrying a pilot and 100 lbs. of mails, will attain a maximum speed of 150 miles an hour, and maintain an average of 120 miles an hour.

The land communications of an express air service must be taken into consideration as having an important bearing on the time-table of the service as a whole. The organisation of such land communications is a matter within the purview of the Post Office, since the collection of mails at the outgoing office, and their distribution from the office of arrival must of necessity be under their control. It has been found impossible in this memorandum to assign any specific time for the sorting and distribution of letters, and therefore no estimate of the time taken in the land communications has been attempted, other than the time for the conveyance of outgoing mails from the Post Office to the aerodrome, which has been assumed to be 40 minutes.

A time-table of the aerial carriage of the mails is now submitted:—

LONDON—GLASGOW.

*One Machine each way daily.*

GLASGOW—LONDON.

LONDON—GLASGOW.

Posting is allowed up to 11.30 a.m., when the mail-bags are closed, and carried to the London terminal aerodrome. The time-table is then as follows:—

12.10 to 2.25 Carriage of the mails by air from London to Newcastle. The aeroplane does not alight at Newcastle, but drops the Newcastle mail into a net.

2.25 to 3.10 The aeroplane continues its flight to Edinburgh. It does not stop at Edinburgh, the mail-bag for that city being dropped into a net.

3.10 to 3.30 The aeroplane completes its last stage to Glasgow.  
GLASGOW—LONDON.

Posting is allowed in Glasgow up to 11.30 a.m., when the mail-bags are closed and taken to the aerodrome. The time-table is then as follows:—

12.10 to 12.30 The aeroplane flies from Glasgow to Edinburgh, alighting to pick up mails.

12.35 to 1.20 The aeroplane continues its flight to Newcastle, where it alights to unload and also to pick up. Newcastle firms wishing to send a letter by air to London would be able to post as late as 12.45.

1.25 to 3.40 The aeroplane continues its flight from Newcastle to London. It may be useful to give an illustration of the facilities offered by such an express service:—

The Glasgow recipient of an urgent letter, say, from London, after acquainting himself with its contents, might be able in some cases to answer at once by telephone or telegram, or he might prefer to write a more detailed answer, which would go to London in the ordinary way by the evening mail, being received in London the next morning. If the recipient of the letter adopted the last-mentioned course, the air-mail being used only one way, there would still be a clear saving in time of a day, as compared with the existing routine of correspondence, in which a letter is posted in the evening in London, received in Glasgow the next morning, the answer being written and posted that day, reaching London on the third morning.

January 1st, 1918.

HARRY HARPER.

NOTE.—In the event of the Main Committee deciding to incorporate any of the contents of this memorandum in a report to the Air Ministry, it is suggested that the various times contained in it should be substituted for those which appear in the original memorandum. (Appendix E. to the Interim Report of the Special Committee.)

#### APPENDIX IV.

*Report of Special Committee No. 3.*

1. The Special Committee were asked to advise as to the development and organisation of aircraft production from a commercial and financial point of view, with special reference to—

(1) The encouragement of the production throughout the Empire of the various types of aircraft required for organised aerial services, particularly so as to ensure a sufficient margin of supply for military and naval requirements.

(2) The probable availability of capital for use in the production of aircraft and in organising aerial services, and the possible necessity of State ownership or of State aid to private enterprise in these respects, either by direct subvention or by specially favourable treatment of some other kind.

(3) The possible necessity for some special control over the raising of fresh capital by companies or firms engaged in the production of aircraft and the running of aerial services.

(4) The possible necessity, after the conclusion of the War, of immediate measures to protect such existing trade interests as are dependent upon war contracts.

(5) The extent to which existing organisations, working under war pressure conditions, will require to be modified in order to establish them on a permanent peace basis.

(6) The consideration of the cost of production of aircraft.

2. At the outset of their enquiry the Committee have met with certain difficulties which are necessarily inherent in the problems on which they have been asked to advise. The aircraft industry, as it exists to-day, is an organisation amply equipped with capital, material, machinery, expert knowledge, and trained labour; but at the same time it owes its development and its present position wholly to the phenomenal war demands of the naval and military authorities. For this reason it cannot be regarded in relation to post-War problems of reconstruction in the same light as other established British industries. There is no past experience of trade on a peace basis to guide the Committee, and, since the post-War aerial programme of the Government must necessarily depend on a number of military, naval, and financial considerations, which it is impossible at this stage to forecast and

indeed upon the result of the War itself, it cannot be expected that any authoritative information can be furnished as to the probable direct Government demand for aircraft on a peace basis.

3. Assuming, however, that there will be some considerable diminution of direct Government orders at the end of the War, the Committee have thought it advisable to consider first of all the position of the aircraft industry generally at that time, and more particularly during the interval which may be expected to occur between the probable diminution of naval and military orders for the Air Forces at the conclusion of peace (whatever the extent of such diminution may be) and the renewal of such orders coupled with some possible orders for civil aerial transport purposes; and, secondly, the constructive steps which should be taken to bridge that interval.

4. In presenting their views and recommendations, the Special Committee desire to emphasise what they regard throughout as an incontestable assumption, namely, that aerial power will be as necessary for the protection of Great Britain and the existence of the Empire in the future as naval power has been in the past. The Committee are accordingly of opinion that it will be necessary, after the conclusion of the War, to take such measures as will maintain the power of production in this country, with its attendant power of design and progressive experiment. Without continuity it would be impossible to have the organisation immediately available when required. Furthermore, if such a policy for National Aerial Defence is adopted as will have the effect of maintaining the aircraft industry on a reasonably sound basis, the development of aviation for civil aerial transport should be the more rapid, inasmuch as those engaged in the industry will possess this power of design and production, backed by the necessary financial resources available for extension to the development of aviation in its civil and commercial aspects.

5. If the expectation is justified that at the end of the War there will be a considerable falling off in direct Government orders—and it has to be borne in mind that even if the same aerial force that exists at the end of the War is to be maintained on a peace basis, the falling off will be great, owing to the much longer expectation of life of aircraft under peace as compared with war conditions—the conclusion of peace will bring with it a reduction not only in the number of firms engaged in the industry, but also, by the cessation of overtime and night shifts, in the output of the remaining firms. But, when such establishments as are at present engaged as a temporary war measure in aircraft building have reverted to their normal pre-War business, the productive capacity of the remaining establishments may still be more than is necessary to maintain the National Aerial Service.

6. With regard to the probable development of aerial transport services the Special Committee would refer to the facilities which this form of transport will provide in letter mail services and in journeys over long distances, or where other means of transport are undeveloped or do not furnish direct connections. It is thought that fast aerial mail services should soon be able to compete with expensive long-distance cable services, as, for instance, from London to South Africa. Yet their development will be gradual, and the number of aircraft they will employ, in the earlier years at any rate, will be small, because even on a sanguine view of the amount of letters which will be sent by air mail at a high rate of postage, the weight of them will not be great, while passengers will be few. It is hardly to be supposed that newspapers and printed matter will be sent in large quantities by air mail for some time to come. It has to be borne in mind, too, that air routes will be mainly international, and that foreign countries will expect that a share in the business will be given to their own aircraft. Viewed, therefore, as a commercial proposition, the Committee do not think that civil aerial transport is likely, at least for some years to come, to develop to such an extent as to involve any appreciable volume of orders being placed with the productive side of the industry in this country. As far as the immediate post-war period is concerned, it should be remembered that machines for civil and commercial purposes will unquestionably need to be specially developed, and any considerable volume of orders will have to await the completion of this process of development. The Committee, therefore, come to the conclusion that, while aerial transport services will ultimately offer hopeful prospects from the financial point of view, the construction of aircraft for that purpose, even if the services attain to the fullest dimensions that can reasonably be anticipated, could for some time to come only reach comparatively negligible proportions, and will be such as to be by itself wholly inadequate for the maintenance of the aircraft industry, even on a greatly reduced basis.

7. The conclusions of the Committee as to the first question mentioned in para. 3 above may be summarised as follows:—

(a) The Committee are unable to foresee any such early development of civil aerial transport as could by itself keep the aircraft manufacturing industry alive. (b) It is essential that the services of the aircraft manufacturing industry continue to be employed for the design and development of naval and military aircraft, and for the carrying out of the national constructional requirements of the future. If that is done, then no special steps would seem to be required in connection with civil aerial transport to establish the industry on a permanent peace basis. (c) Failing the employment of the aircraft manufacturing industry for the purposes and to the full extent above indicated, then the industry could only be kept alive for civil aerial transport purposes by active Government assistance, not necessarily in the form of subsidies on manufacture, continued over several years to come.

The foregoing conclusions point to the necessity of some constructive steps being taken to ensure the maintenance of the aircraft industry.

8. In considering the position of the aircraft industry on the termination of the war the Committee have had before them an interesting memorandum by Mr. A. E. Turner, which is presented as an Appendix to the present Report.

9. Before offering suggestions as to the constructive steps to be taken, the Committee desire to point out that it is of the first importance that the task of considering and of dealing with constructive proposals in regard to all aeronautical matters after the war should be definitely assigned without delay to some one Government Department which would, of course, only act after consultation with such other Government Departments as might be concerned. It appears to the Committee that such matters should be dealt with by a single Central Government Authority, but that, to be effective for this purpose the Authority should work in conjunction with a body representing the industry.

10. The Committee are of opinion that the solution of the problem of the constructive steps to be taken, and with it the solution of the problem raised in the second heading of the terms of reference to the Main Committee as to the disposal of the surplus of machines likely to be in the hands of the Naval and Military authorities after the War; should be sought along the lines of so using this surplus as to stimulate immediately a demand for aeroplanes in some new direction. The Committee therefore recommend:—

(a) That an offer should be made by the Home Government to the larger self-governing Dominions and to Egypt and India to supply a definite number of machines, free of cost, as soon as they become available, conditionally on these countries, in the meantime, submitting approved schemes for the formation of units of an Imperial Air Force. (b) That the Government should announce that in the event of the formation of companies for aerial transport services, or other commercial purposes, they would be prepared to afford facilities for the purchase of machines at a reduced price (say,

one-quarter or less fraction of the original cost) to substantial companies. This will operate to facilitate the employments of pilots who will be returning to civil life on demobilisation.

These two proposals taken jointly would relieve the Government of heavy expenses in providing storage accommodation for machines which are too valuable for destruction, and should also relieve the stagnation in the design of military types which would inevitably occur if the necessity of using up large stocks of surplus aeroplanes prevented the authorities from placing any but the smallest possible orders for machines of new design. The design of aeroplanes expressly for civil purposes would also receive a stimulus, as the companies would early begin to find points in which the machines thus taken over were susceptible of improvement from the point of view of the new use to which they were being put.

11. On the broad question which was raised at the first meeting of the Main Committee of State ownership against private enterprise, the Special Committee hold the view that the industry of aircraft production and transport should be so dealt with as to interfere as little as possible with individual enterprise.

12. The foregoing paragraphs cover, so far as seems possible in the light of such information as is available, the subject matter of headings (1), (2), (4), and (5) of the terms of reference to the Committee. Data are wholly lacking by which to estimate the cost of production of aircraft or the running costs of civil aerial services after the war, and the Committee fear that detailed discussion of the subject matter of headings (3) and (6) of their terms of reference would be premature at the present stage, and could serve no good purpose.

H. White Smith (Chairman); Alan E. L. Chorlton; L. N. Guillemard; G. Holt Thomas; E. P. Morris (with certain reservations); G. E. P. Murray; \*Mervyn O'Gorman, Lieut.-Col.; \*W. P. Schreiner; J. D. Siddeley; T. Sopwith; \*A. E. Turner; E. R. Wayland, Lieut.-Col.

D. O. MALCOLM (Secretary).

January 11th, 1918.

Those members whose names are marked with an asterisk append the following reservations:—

I do not consider that the aerial mail service will actually compete with (see line 4 of para. 6 of the report), but that it will be complementary to, and will probably activate the use of long distance communication by electric cable.

MERVYN O'GORMAN, Lieut.-Col.

1. While I accept the conclusion that present conditions do not justify the advice that the State here should immediately itself undertake the industry of aircraft production, and that, therefore, constructive steps are necessary to ensure the maintenance of that industry by the enterprise of the firms and companies which hold the field, I consider that before long the wisdom of establishing State control of and active participation in that industry will be recognised, and practical steps will be taken in that direction for the benefit of the nation.

2. I do not discern any insuperable obstacles in the way of an early practical commencement of civil aerial transport within the United Kingdom as a State undertaking, or under direct State control, and I regret that it has not been found possible to include in this report practical suggestions for experiments in that direction at the earliest possible moment.

W. P. SCHREINER.

I desire to add, by way of reservation, that in my opinion para. 6 of the report gives an unduly gloomy impression of the prospects of civil aerial transport in the near future, especially in regard to passenger carrying.

A. E. TURNER.

## APPENDIX.

Memorandum by Mr. A. E. Turner on the position of the Aeronautical Industry on the Termination of hostilities. (This is not printed.)

## APPENDIX V.

### Supplementary Report of Special Committee No. 3.

1. The Special Committee have been asked to consider certain points raised by Capt. Groves in a Notice of Motion handed in to the Main Committee. The Special Committee had not previously dealt with these points because by their terms of reference they were called upon rather to advise as to the probable position of the aircraft manufacturing industry in this country at the end of the War, than to consider whether it was necessary in the general interest of the State to take special steps to foster the civil use of aircraft.

2. They have now considered the further points referred to them, and desire to emphasise that it is of great importance, in the national interest, that the use of aircraft for civil purposes should by some means or other be fostered to the utmost extent, and with the rapidity possible, immediately after the War.

One reason is that the civil use of aircraft will ultimately play an important part in the commerce and transport of the future, and it is undesirable that the British Empire should fail, through allowing other countries to be first in the field, to secure its due share of such commerce and transport.

A second and very vital reason is that in any future war the air will play a more important part than ever, and unless the State is to maintain on a peace establishment a naval and military air force as large as it will require in any future war, there must be a reservoir of aerial power capable of meeting a sudden demand for the expansion of the naval and military air force, just as the shipbuilding industry and the mercantile marine are capable of meeting such a demand on the part of the Admiralty.

3. It has been shown in the previous Report of the Special Committee that if the aircraft manufacturing industry is to be almost wholly dependent on direct State orders for naval and military aircraft, and such orders fall off greatly at the end of the war, as it is only prudent to assume that they will do, the aircraft manufacturing industry will dwindle with great rapidity. Therefore, in order to keep the manufacturing industry in a state of healthy activity, and to secure that there shall be as large as possible a number of aircraft and of skilled and practised flyers in existence available to be drawn upon by the State, it is vitally important that a market should be created for aircraft other than that provided by the State's direct naval and military orders.

4. It is not enough merely to maintain the aircraft manufacturing industry in a static condition: it is necessary, particularly in an industry which is still at so early a stage of its growth, that there should be every opportunity and inducement for the inventor and for progressive development and improvement in design. This consideration only serves to emphasise the importance of immediate steps being taken to foster the civil commercial use of aircraft. Progress and improvement are likely to be best stimulated by the hope of commercial gain, as has been shown in the history of other industries, notably that of shipbuilding.

5. The Special Committee adhere to the view expressed in their earlier report that it is impossible to foresee any such early development of civil aerial transport as could by itself keep the aircraft manufacturing industry alive; but it follows from what has been said above that it must be developed at any rate to such an extent as will ensure that the resulting orders will suffice, along with such direct naval and military orders as continue to be given after the War, to secure the end in view.

\* No printed.



This end will have been achieved when a system of properly planned and predetermined air routes has been instituted, with their aerodromes and other requirements, satisfying both military and commercial needs, between which there is no real conflict. On these routes there should be civil aerial services wherever there is a reasonable demand for the facilities of aerial traffic and irrespective of the test of financial success. Such services should ensure a large reserve of skilled airmen and of aircraft available for, at any rate, subsidiary military purposes, and should afford a market for aircraft manufacture sufficient to maintain the manufacturing industry on a scale allowing of a prompt and large expansion of the industry for war purposes.

6. The development of civil aerial transport to the extent outlined in the preceding paragraph cannot, in the opinion of the Special Committee, be brought about without some State action.

That State may :—(A) Give its assistance in one or more of many possible forms to private enterprise; or (B) May itself own and operate or participate in the ownership and operation of aerial transport undertakings.

7. These alternative policies have been very fully discussed by this Committee, and it is thought desirable that the respective arguments in support of both policies should be set out.

#### Alternative (A)—

On behalf of this course, which is that favoured in the earlier report of the Special Committee, paragraph 11, it is urged that, as in the case of manufacture, so also in the case of the civil use of aircraft, the hope of commercial return is the utmost effective stimulus to enterprise, and that the experience of almost all other enterprises, at least in the United Kingdom, supports this view.

In support of private enterprise, whether entered into by firms or companies, it is argued that progress is much more rapid than has been found possible under the machinery of Government Departments. The case of civil aerial transport seems to be one which calls for special enterprise of a peculiarly open-minded character. The exploration of the possibilities of civil aerial transport must be undertaken in a spirit untrammelled by those methods which have hitherto been usually associated with Government control. Rapid progress in this new field of transport is essential if this country is to hold its own.

It is urged against the exclusive operation of aerial transport services by the State that this system would mean that the State would be the only purchaser of aircraft, and that this would necessarily discourage the desired development of invention and design, and might involve the necessity of the State taking the business of manufacture as well as of the use of aircraft into its own hands, a course which, for the reasons given in paragraph 4 above, is to be deprecated.

It is urged further, therefore, that :—

(a) Firms or companies should without interference be allowed to undertake commercial services where they are willing to do so. (b) Firms or companies which undertake services desired by the State, but likely in themselves to be unremunerative, should be assisted by the State to the extent calculated to provide a reasonable return on the capital invested. Such assistance might take the form of a guarantee of a minimum rate of interest on capital, or even of cash subsidies fixed according to the number of aircraft and skilled flyers kept in continuous employment. Precedents for arrangements of this kind are to be found in cases where the State has assisted steamship companies by providing, on very easy terms, part of the capital cost of ships constructed to certain approved specifications or by subsidising the ocean carriage of mails.

Among other methods by which the State could assist private enterprise where such assistance is required, are the following :—

(1) Charters might be granted to properly organised companies, giving them exclusive running rights for defined aerial routes, either in the United Kingdom or in the British Dominions and Colonies. (2) Aerodromes, landing places, meteorological stations and wireless telegraphic installations which will, in any case, have to be provided for the naval and military air force throughout the country, might be put freely at the disposal of private flyers and commercial undertakings as the roads are put at the disposal of the travelling public. (3) The establishment of high-speed land transport by motor vehicles and otherwise between aerodromes in the vicinity of large towns and the business centres of such towns. (4) The State might encourage, by liberal contracts, the carriage of mails and parcels by air, or might undertake to take up a certain proportion of the accommodation provided for such carriage. (5) Facilities might be offered for the purchase or hire, at low prices, of aircraft surplus to military requirements at the end of the War. (6) A retaining fee might be paid to such owners of aircraft as agree to hold them at the disposal of the State.

#### Alternative (B)—

On behalf of the State ownership of civil aerial transport services, either exclusively or in partnership with private enterprises, it is argued :—

(a) That since it is admitted that State assistance is in any case necessary for the development of the civil use of aircraft to the extent necessary in the national interest, a system under which all chances of profit are left to private companies, while the State undertakes a great part of the risk, and the certainty of expense, is the least desirable system from the public point of view, and the most exposed to justifiable criticism. (b) That if the State must undertake civil aerial transport services in the national interest, it should at least undertake or participate in owning and controlling those services which promise to yield a profit as well as those which do not. (c) That such a system would avoid the possibility of confusion and economic waste through unnecessary competition between private companies in a field in which the State protected them from loss, and the certainty of waste involved in private companies obtaining Provisional Orders or Private Acts of Parliament, and in such directions as the expense of company promotion and the unnecessary multiplication of directing staffs. (d) That State ownership or participation with private enterprise need not be an unsuccessful method of development. (e) That while the ownership by the State of commercial enterprises may lie under the burden in each case of justifying its own necessity, it may fairly be said that in this instance the insufficiency or unsatisfactory character of the alternatives put forward furnishes the required proof, and that transport has always been one of the first fields in which public ownership has shown itself successful, as witness even in Great Britain many municipal tramway enterprises. (f) That, moreover, in this particular instance the matter is so bound up with national defence that any State would be justified in going far beyond its accustomed limits in commercial undertaking in order to make certain of creating the equipment of men and material and the sources of production needed for its own protection, and that whatever may be the normally held view of State ownership, State ownership of aerial transport services including all ancillary equipment is forced upon the community as an unavoidable measure of national self-protection.

8. The Special Committee feel that the questions of principle and policy involved in the two alternative views described above raise such grave issues that it is for the Main Committee itself to judge between them; but in any case it seems necessary that the steps to be taken to secure the main object aimed at, namely, the provision of the indispensable reservoir of aerial power, should be considered and determined upon by His Majesty's Government at once, as it will be too late to consider them after the War. If at the conclusion of peace direct naval and military orders fall off very greatly, and no

steps have been taken in advance to create other markets for the manufacturing industry, the manufacturing industry will dwindle with great rapidity and may well cease altogether to exist, except to the extent necessary to comply with such diminished naval and military orders as the State may still continue to give. It cannot last without orders while the State is considering what steps can be taken to develop the commercial use of aircraft—a process that is likely to occupy some time.

H. White Smith (Chairman); \*L. N. Guillemard; R. O. Cary; Alan B. L. Chorlton; R. M. Groves, Wing Capt., R.N.; G. Holt Thomas; J. W. McCay, Major-General; \*G. E. P. Murray; Mervyn O'Gorman, Lieut.-Col.; Frank Pick; W. P. Schreiner; J. D. Siddeley; T. Sopwith; Arthur E. Turner; E. R. Wayland, Lieut.-Col.

D. O. MALCOLM (Secretary).

March 8th, 1918.

L. N. GUILLEMARD.

G. E. P. MURRAY.

NOTE.—A summary by the Chairman, Mr. White Smith, of the two reports of Special Committee No. 3 is attached.

#### Brief Summary of First and Supplementary Reports.

##### Special Committee No. 3.

The questions originally put to the Committee and the conclusions arrived at can be briefly stated as follows :—What will be the position of the aircraft designing and constructing industry at the conclusion of the War, and how far can the industry provide for the requirements of civil aerial transport for aircraft? It was immediately found that, so far from there being any difficulty in meeting the requirements for aircraft, the demands for civil aerial transport, for some time, would be quite inadequate to keep the industry alive. It was considered essential in the interests of National Defence that the industry should be kept alive. The Committee, therefore, felt that, in order to keep the industry in such a condition as to be always able to respond to war emergencies, the services of the industry should continue to be employed for the design and development of naval and military aircraft, and for the carrying out of the national construction of aircraft for the future, and this would enable the design and construction for civil aerial transport to grow on a sound and permanent basis. In effect, while the Committee have always felt complete confidence in the eventual success of civil and commercial transport, yet they felt that, for some time to come, it could not be looked upon to support the industry.

The other phase of the question which is dealt with by the supplementary report may be summarised that :—

(a) Cost what it may, this country must lead the world in civil aerial transport. (b) The State must have a reservoir of aerial power capable of meeting a sudden demand for expansion of the Naval and Military Air Forces.

Put shortly, we may say, "It must be done." Approaching the question, therefore, from this point of view, it becomes evident that, if civil aerial transport is so necessary to national interests, every step possible must be taken by this country and the Empire to foster the rapid development of this form of aerial power, and by it the power of production in this country.

The development of civil aerial transport to the extent outlined in the preceding paragraph cannot, in the opinion of the Special Committee, be brought about without some State action.

The State may (a) Give its assistance in one or more of many possible forms to private enterprise; or (b) may itself own and operate, or participate in the ownership and operation of, aerial transport undertakings.

The arguments in support of each of these policies have been very fully discussed by the Committee, and are set out fully in their Report. It is desired that the members of the Main Committee shall consider them in full as set out, and for this reason no résumé has been attempted.

In conclusion, the Special Committee feel that the questions of principle and policy involved in the two alternative views described above raise such grave issues that it is for the Main Committee itself to judge between them; but in any case, it seems necessary that the steps to be taken to secure the main object aimed at, namely, the provision of the indispensable reservoir of aerial power, should be considered and determined upon by His Majesty's Government at once, as it will be too late to consider them after the War. If at the conclusion of peace direct naval and military orders fall off very greatly, and no steps have been taken in advance to create other markets for the manufacturing industry, the manufacturing industry will dwindle with great rapidity and may well cease altogether to exist, except to the extent necessary to comply with such diminished naval and military orders as the State may still continue to give. It cannot last without orders while the State is considering what steps can be taken to develop the commercial use of aircraft—a process that is likely to occupy some time.

(Signed) H. WHITE SMITH, Chairman.

#### APPENDIX VI

##### Report of Special Committee No. 4.

This Special Committee was appointed to advise the Main Committee upon the problems of labour and of the technical education of artisans and mechanics, male and female, arising in the development of civil aeronautics with special reference to :—

(1) The possibility of setting up a model type of industrial organisation applicable either to the whole of labour employed in aircraft manufacture and in aerial transport, or, if necessary, to separate groups of labour so employed, for the purpose of avoiding the friction and conflicts which characterise present labour disputes.

(2) Problems connected with dilution of labour, and the rates of and methods of calculating wages.

(3) The necessity for some scheme of technical education applicable to artisans and mechanics, male and female, employed in aircraft manufacture and in aerial transport, and the extent (if any) to which such a scheme should be dependent upon State or municipal assistance.

(4) The necessity for an administrative body or bodies to control the entire industry of aeronautics with regard to labour and labour conditions, including technical education, as above mentioned, and the question of the representation on such body or bodies of the State, the employer and labour, and the limits within which the control of such a body should be exercised.

1. The Special Committee have given their most careful consideration to the questions submitted to them by the Main Committee. Before proceeding to deal with detailed points arising on its terms of reference, the Special Committee have thought it advisable to submit at the outset of their report the conclusions they have arrived at in relation to the four headings to which special attention is directed in those terms of reference. These conclusions are submitted in the form of answers to the specific questions raised in these four headings :—

(1) (a) There is no possibility of setting up a model type of industrial organisation applicable either to the whole of the labour employed in aircraft manufacture or to separate groups of labour so employed. At the

\* In signing this Report we wish to point out that it is based on the supposition that strategic requirements will necessitate the maintenance of a larger productive capacity than commercial demands can absorb, and that our acquiescence in the measures recommended is conditioned by that supposition.

same time the Committee think that the suggestions contained in the Report of the Sub-Committee of the Reconstruction Committee on the relations between employers and employed (generally known as the Whitley Report) are no less applicable to the relations of labour and capital in aircraft manufacture than to labour employed in the whole group of engineering industries. (b) The Committee come to the same conclusion with regard to labour or groups of labour employed in aerial transport services; but they would suggest that, since at present there does not exist an organised body of labour employed in aerial transport services, such a body might offer a specially favourable field for the realisation of the ideals outlined in the Whitley Report.

(2) There are no special problems connected with the dilution of labour and the rates and methods of calculating wages peculiar to labour employed in aircraft manufacture or in aerial transport services as such.

(3) There is no necessity for any special scheme of technical education applicable to artisans and mechanics, male and female, employed in aircraft manufacture and in aerial transport services, as distinct from similar persons employed in other occupations; but the Committee think that any schemes of technical education of persons employed in the engineering industries generally are particularly suitable to persons employed in the aircraft industry, and that such schemes should be so arranged as to include the technical education of the latter class.

(4) There is no necessity for the creation of an administrative body or bodies to control the entire industry of aeronautics with regard to labour and labour conditions other than the machinery of the Joint Standing Industrial Councils recommended in the Whitley Report.

In submitting these conclusions to the Main Committee, the Special Committee have divided the main problem referred to it into two general headings, viz., the problem of labour in aircraft manufacture and the problem of labour in aerial transport services. The grounds upon which these conclusions are based are contained in the following paragraphs of this report.

## Labour in the Industry.

2. In this body of labour there were employed in 1916 about 100,000 persons, of whom about 25,000 were women or boys under military age. These numbers are constantly increasing. They are, indeed, growing so rapidly with the growing demand of the Government for aircraft—which demand has of late been suddenly and very greatly expanded—that reliable statistics are very difficult to obtain. Even if they could be obtained they would at once become out of date, as fresh firms come into operation as aircraft constructors. So long as the War lasts, there is likely to be continuous increase in the number of persons employed. The construction of aircraft engines is a specialised and highly important section of engineering, and it necessitates the employment of a considerable number of skilled mechanics—fitters, turners, coppersmiths, sheet-metal workers, &c.—as well as a due proportion of semi-skilled and unskilled workers. The construction of aircraft, in which woodwork is at present the principal factor, involves the employment of woodworkers of varying degrees of skill, and to meet the demand for additional labour brought about by the War, large numbers of woodworkers have been drawn into the industry from other trades, including the building trade, furniture trade, coachbuilding, &c. In both sections of the industry (engines and aircraft) there has been not only "dilution," but also the introduction of female labour to new work prior to the war. The employment of women has steadily extended.

3. The Committee discussed the possibility of dealing with the industry as a distinct economic organisation, and dismissed this as entirely impracticable. Mainly, the industry is a branch of engineering of a similar nature to the automobile industry. It seems impossible to sub-divide the engineering industry anywhere by vertical lines of division. Skilled and semi-skilled labour flows to and fro, in its own trade, between one department of engineering work and another. Engineering labour organisation and engineering technical education, the Committee are persuaded, are each whole and indivisible problems.

4. The Committee find that under the Reconstruction Committee there have been appointed Sub-Committees on relations between employers and employed, and on war pledges, while committees have also been appointed on the engineering trades; on the textile trades; on the teaching of science; and on juvenile education in relation to employment after the War. Of the bodies above mentioned, the Committee are informed that the terms of reference to the War Pledges Sub-Committee of the Reconstruction Committee merely deal with the legal steps that would be necessary on the assumption that all the pledges given to organised labour during the War in connection with dilution, the employment of women, and the like, are to be carried out in their entirety, a matter which is not directly the concern of this Committee. The Committee on Science in the Educational System are as yet only at an early stage of their enquiry. The Report of the Committee on Juvenile Education in relation to employment after the War has been published as a Parliamentary Paper (Cd. 8512), and forms the basis of the Education Bill.

5. The Sub-Committee of the Reconstruction Committee on relations between employers and employed, under the chairmanship of Mr. J. H. Whitley, M.P., is the body most directly concerned with the post-war problem of the relations between labour and capital, and has issued an Interim Report on Joint Standing Industrial Councils, which has been published as a Parliamentary Paper (Cd. 8606). The Committees appointed to consider the position after the War of the great groups of industries classified under the head of engineering have been content to leave this aspect of their problem to be dealt with by Mr. Whitley's Committee, and we feel that a committee dealing with the as yet comparatively small aircraft industry, especially as it depends so largely on the engineering industry, may well follow their example. The rapid expansion of the manufacture of aeroplanes and airships has, however, attracted to the aircraft industry a large and miscellaneous body of labour whose elements were formerly connected with trades other than the engineering trade, and whose members belong to trade unions concerned with entirely different trades, e.g., the various branches of the building trades, coach and carriage building and upholstering, cabinet making, organ building, &c. The majority of these workpeople are woodworkers, and while many of them are skilled men, possessing the degree of skill necessary for their previous occupations, the skill called for by the aircraft industry is not a highly specialised skill, which cannot be used in other woodworking industries. It may be that many of those who, prior to the special demand of the Government for aircraft for war purposes, were employed in other industries, will return to those industries if the end of the War brings with it a great diminution in the demand for aircraft; it must, however, be assumed that the aircraft industry will exist in the future to a very much greater extent than was the case before the War, and it follows, therefore, that the labour problems connected with the industry will be influenced by the "new blood" which has come into the industry, and by the forces with which that "new blood" is connected. The possibility must not be overlooked that in the future wood may be more or less replaced by metal in the manufacture of aircraft, and that consequently the total number of woodworkers employed in the industry will be uncertain.

6. It is impossible to forecast at present the special labour problems that are likely to arise in the industry, and it is useless, therefore, to attempt any detailed suggestions as to how they may be dealt with when they do arise. But there are one or two features which it may be worth while briefly to

mention, as they will serve to show in what respect the industry differs from the ordinary well-defined industry and to indicate the type of problem with which those who are concerned in the industry may be faced.

7. At the moment the aircraft industry is more closely allied to the engineering trade than to other trades, and the principal firms are members of the Engineering Employers' Association in the districts in which their respective works are situated; the industry is, therefore, linked on the employers' side, with the organisation of the Engineering Employers' Federation, while the skilled engineers are members of the various skilled trade unions connected with the engineering trade. On the other hand, the trade unions to which the bulk of the woodworkers belong (and they are numerically a very large proportion of the industry) are not primarily connected with the engineering trade; they are connected with trades such as the building trades, and they have the associations and traditions of those trades. The third class (and it is an important one) consists of the women, who are employed on the engineering side, the woodworking side, and as fabric hands, and who, in so far as they are organised, are members of the National Federation of Women Workers or of one of the general workers' unions who specialise in female members. These three groups of trade unions have not hitherto been identified with a single industry, and their traditional interests may tend to be divergent. The position is one that calls for special consideration on the part of the employers, and it may, no doubt, be assumed that it is already receiving such consideration at the hands of the employers' organisations. We feel that it is for those organisations, in conjunction with the labour organisations, to consider themselves how the special circumstances may best be met and that it would not be helpful for this Committee to attempt to advise them.

8. How far the various labour organisations within the aircraft industry may be able to reconcile their interests, it is impracticable now to say. Some of the woodworkers, themselves members of the various woodworking unions, have formed woodworkers' aircraft committees in various centres, and if it should happen that the women's organisations are able to join with such committees, there would exist a fairly well-defined "labour side" to the industry, consisting, on the one hand of the engineering section (represented as stated above, by the skilled engineering trade unions), and on the other hand of the woodworking and fabric sections (represented by some joint body of woodworkers' unions, plus the women's organisations).

9. Having regard to the special development and rapid growth of the industry, and to the somewhat peculiar character of the trade (being linked with but not entirely covered by the engineering trade as ordinarily understood), there may be difficulties in adopting directly for the aircraft industry the scheme of Joint Councils recommended by the Whitley Committee. The consideration and solution of these difficulties are, in our view, matters for the parties directly concerned rather than for this Committee, and we think our participation in the question should begin and end with the recommendation that in the consideration of the subject the parties should have in mind the principles underlying the Whitley Report, and should approach the problems in the spirit indicated in that Report.

## Labour in the Air Service.

10. The Committee have also given their careful attention to the question of the labour connected with air routes and services. Exact figures of the labour likely to be so employed cannot be hoped for at the present time, but it seems improbable that the civil use of aircraft can immediately absorb any appreciable fraction of the trained personnel, which the conclusion of peace may leave surplus to the requirements of the naval and military air services.

## Education of Labour in the Service and Industry.

11. The Committee are of opinion that the technical education of aircraft workers cannot be conveniently treated as a special subject; like the labour itself, the education work is divided between the engineering and the woodworkers' trades, and the Committee see no advantage in adding anything here to the counsels of other bodies well able to deal with those matters, such as the recently formed central organisation for the correlation and improvement of engineering training.

\*A. E. Berriman; Neville G. Gwynne; Arthur Morley; W. P. Schreiner J. D. Siddeley; E. R. Wayland, Lieut.-Col.; H. J. Wilson.

D. O. MALCOLM (Secretary).

November 7th, 1917.

## Minority Report by the Chairman.

In presenting the findings of Special Committee No. 4, the Chairman would like to add a few dissentient observations.

While the engineering employers have been fully and ably represented on the Committee, the ideals of labour have had little or no expression, and there has been, he thinks, a disposition to exaggerate the importance of the welfare of the industry in relation to the destinies of the Empire. This is particularly manifest in the shortness and quality of the paragraph relating to the Air Services. An excess of tenderness for the no doubt deserving private groups that may wish to undertake "air" transport at the end of the War, and an excess of financial timidity, seem to have blinded the Special Committee to the supreme importance to the Empire of the immediate establishment of Imperial Air Services at the Peace. For such an end the business adventurer in air exploitation should be as willing to face stress and ruin as our common soldiers have been to face toil and death in Flanders.

The British Islands are small inlands, and our people numerically a little people; their only claim to world importance depends on their courage and enterprise, and a people who will not stand up to the necessity of an Air Service planned on a world scale and taking over thousands of aeroplanes and thousands of men from the very onset of peace, has no business to pretend to anything more than a second-rate position in the world. We cannot be both Imperial and mean. For this reason the Chairman dissents altogether from the timid findings of the Special Committee set out in paragraph 10.

Assuming, as he does, that a boldly conceived world air service is essential to our Imperial pretensions, the Chairman deplores the narrowness of outlook that has debarred the Special Committee from seizing its opportunity to plan an Air Service not only great in scale but great in spirit. This Civil Air Service afforded the possibility of a new departure in the organisation of our workers, and the Chairman of Special Committee No. 4 appeals from that Special Committee to the Main Civil Aerial Transport Committee to consider, before it is too late, the possibility of creating from the first a great service with a common spirit. Here, at least, we could anticipate and avoid the clash of direction and labour. It would be possible to associate from the first the entire personnel of the service with the management. It would be practicable and in accordance with the more constructive ideas that now animate labour circles to give everyone employed, from traffic manager and pilot to groundmen, a representation upon the general management. What is proposed here is no mere "labour" delegate. What is desirable is a stage of affairs in which everyone in the management will feel concerned in the mental and bodily welfare of the personnel, and in which every worker, whether on the directive or the operative side, will consider himself concerned for the efficiency of the Service. Everyone in the Service could have a voice in the appointment of these suggested representative members of the manage-

\* Mr. Berriman signs this Report to the deletion of the following words in paragraph 11, "like the labour itself, the educational work is divided between the engineering and the woodworkers' trades."



ment. There are two chief interests in every service of public utility; the first of these is the general community, for which, logically, a portion of the management appointed by the State should stand; the second is the Service itself, for which stand the representatives of the directing staff and of all engaged in the Service. In the case of a State-owned Service, these two elements would constitute the entire management; in the case where private enterprise was a factor it would also provide a third factor in the general management. Suppose, for example, an aerial transport company, fostered by the State for reasons of policy by the grant of monopoly running rights over given routes, or by a guarantee of a minimum rate of interest on its capital. It might be managed by a board of directors, some appointed by the shareholders in the ordinary way, some by the State, to watch its interests, and some by the employees. If it be admitted that such an arrangement would tend to prevent disputes and strikes, it is probable that it would commend itself to the State. The State would have a direct interest in the smooth and continuous working of the Service. This interest would be presupposed in the grant of monopoly running rights, or in a guarantee of a minimum rate of interest on capital, and the State might even make the adoption of an arrangement of the nature suggested a condition of its grant of such privileges. But these possibilities have been disregarded by the Special Committee as a whole. Many of its members seem to have been obsessed by a conception of private enterprise working its way slowly to an efficient air service at the expense of casually employed workers. From the first the workers under such conditions will be forced into the self-protective and hostile attitude too characteristic of British labour. Unhappily for the British employer it is incredible that Berlin, America, or the world generally will wait while these time-honoured British methods feel their way through a cycle of labour adjustments to a minimum of efficiency in a maximum of time. The Air Service of the world will inevitably be taken out of British hands—if this is our way to Civil Air Transport. Unless we are prepared to plan now for a great public air service, generously served by generously treated workers it is childish to anticipate any great future for our Empire in the air.

The Chairman also regrets that the Special Committee has been unable, as a whole, to make any recommendations with regard to the employment of discharged sailors and soldiers. There are at present numerous opportunities for the utilisation of partially disabled sailors and soldiers in the aeroplane factory, and there is no conclusive reason why much of that employment should not continue after the War, due regard being shown to trade union interests. There are many occupations, both in the aeroplane factory and in the aerodrome, where physical disabilities of a not too serious nature do not debar men from useful work—in some cases after a preliminary period of practical training. Splicing of wire cable, for instance, and acetylene welding are sedentary jobs requiring no great exertion, which can be done by any man possessing the full use of his hands, arms, and eyesight. These jobs are successfully undertaken by women, but at the present time there are probably not enough women trained to meet the demand. Many other jobs could also be undertaken by men of this kind, such as those of storekeepers, record and issuing clerks, watchmen, caretakers, and works' police; also those of gatekeepers and turnstile keepers at aerodromes, and of ground-men for keeping aerodromes in proper condition. The intermittent nature of aerodrome employment makes it peculiarly suitable for men whose injuries, while leaving them capable of occasional activity, unfit them for continued hard work. And these remarks apply not only to those engaged in actual labour, but also to those who may be engaged in the management of these various grounds. It is to be noted that the Ministry of Munitions Dilution Department is giving attention to this particular problem, and will probably accumulate some valuable experiences.

Generally, these men will be in receipt of pensions, and there seems to be no justification for the rule understood to prevail in the case of men directly employed by Government, under which a man in receipt of a pension is not allowed to draw in the shape of pension and wages combined more than the rate of wages ordinarily given for work of the nature of that in which he is employed. It would appear that a man in receipt of a pension of 25s. a week, if employed by Government on a job for which the ordinary rate of wages was 25s. a week or over, would draw no pension at all while so employed; or, if employed by Government on a job for which the ordinary rate of wages was less than 25s. a week, would draw only so much of his pension as would bring his total weekly emoluments up to 25s. This rule must, it would seem, put a premium on idleness and upon taking service with a private employer rather than with the Government, for in the service of a private employer a pensioner would draw his wages and his full pension as well. It is certainly worth while to draw attention to this point, although it does not arise exclusively in connection with the aircraft industry.

It is possible that a difficulty may arise in connection with the employment of disabled sailors and soldiers if their injuries are such as to incapacitate them from earning trade union rates of wages, owing to objections on the part of the unions to their being employed at lower rates; but such objections ought not to be insuperable, provided none but ex-sailors and ex-soldiers in receipt of pensions are employed at less than union rates, and provided that they are so employed that the wages which they can fairly earn, when added to their pensions, makes up a total emolument equal to or greater (by an agreed upon amount) than the union rate of wages, and that their employment is not more profitable to the employer. This is a question upon which a speedy agreement with the trade unions is most desirable. What is needed is some general decision upon the rules under which disabled soldiers shall be employed. It may be suggested that the trade unions should themselves

propose a classification of disabled men, and should suggest a minimum wage for each class—on the assumption that employment will not diminish the amount of the man's pension.

There is a third matter in which the Special Committee has failed to rise to its opportunities, and that is in connection with the possibilities of developing an imaginative solidarity in the Air Industry and Services. To be frank upon a matter of public importance too urgent for euphemisms, the bulk of employers in Great Britain appear to be men differing rather in tenacity of character than in breadth of outlook from the workmen they employ, and they do not seem to understand that elementary psychology of modern industrial employment. They do not see their duty and opportunity of mental leadership; they decline flatly to be the captains instead of the exploiters of industry. The modern worker reads, thinks, and has his imagination stimulated in a hundred ways that did not exist in the dull round of the mid-Victorian wages serfs' experience. In addition, we shall presently be seeing the return to industry of great numbers of workers whose minds have been further quickened by the War. It is the interest, therefore, quite as much as the public duty of the modern employer to do his utmost to give the worker a living interest in his work, to make him, or her, feel, not a driven "hand," but a person sharing the effort and triumphs of the industry. The alternative is that disastrous and dangerous modern product, the professed "rebel." Something more than merely technical training is wanted for a proper industrial mentality; imaginative training is about equally important. Among other devices that should be employed in the organisation of a modern industry, is a "trade" paper brought within the reach and attention of every worker; a paper to sustain the living interest of the worker in his industry, to facilitate understandings, stimulate ambition, and keep him or her alive. In the case of the Air Industry and Service, a weekly illustrated paper devoted to the enterprise of, and innovations in, aeronautics, to the illustration of model works at home and abroad, to the discussion of new methods and trade problems, and to the impartial discussion, by means of correspondence, of current labour difficulties, is required. The free and full development of the latter feature is highly important. Every competent authority upon labour troubles agrees that the essence of these troubles is suspicion, and the way out of a suspicious situation is for management and worker alike to cultivate outspokenness and "play with the cards on the table." With this proposed trade paper a method of tuition by correspondence and self-education could be very easily combined. What is here suggested is not a paper merely for the discussion of "shop"; its aim and effect would be to lift every worker in both branches of this field out of the little rut of merely mechanical participation into an understanding of the story of this new and wonderful field of human effort. Aeronautics presents as marvellous and romantic a story as any in the human record. That wonder and romance are in themselves a force which, to put it at the lowest level, it is unbusinesslike to waste. But many employers seem unable to appreciate the rôle of such a stimulant. Indeed, some of them seem to regard the proposal with terror, as an unjustifiable illumination of the privacies of business enterprise.

How the paper could be produced and supplied is a question of some delicacy. It might, perhaps, be produced by a special joint committee, representing the directors and labour of the industry, maintained by a capitation tax upon the employer of a 1d. or so per head of the number of workers employed, and distributed gratis at pay day. But such official papers are apt to lack the spirit and interest of periodicals conducted upon more normal lines. Probably it would be less expensive to the employer and altogether more successful to select one or several of the existing "Air" weeklies and, subject to their agreement to insert certain definite features, to purchase and distribute in large quantities. It would not be difficult to arrange for an added page edited by a special joint committee of directors and labour on the model of the added page in the ordinary parochial magazine. A wholesome competitive element would be introduced by allowing each worker to choose which of the several selected papers should be given him.

Another important factor in the consolidation of the Aeroplane Industry and Service which Special Committee No. 4 has preferred to ignore, is the use of the cinema by the organised industry. This could be made of the utmost service in attracting young people to the industry, and keeping the general public intelligently sympathetic with its progress. It is as much the business of modern industry to cheer, interest, educate, and invigorate its workers and keep the public in touch with its activities as it is to get machinery of the highest efficiency. A business that bores or exasperates its employees, or the public is a badly-organised business.

This much the Chairman of Special Committee No. 4 begs to add to the Report that he here presents. His differences from his colleagues are probably all to be traced in the end to a difference in their and his interpretation of the aim of the Civil Aerial Transport Committee. Several of the recommendations embodied in this Minority Report have indeed been set aside by Special Committee No. 4 only because they are judged to be beyond the scope of that Special Committee. But the Civil Aerial Transport Committee as a whole, he holds, is a Committee not to make decisions, but projects, and a freedom and boldness with regard to the terms of reference and to new ideas are more in the spirit of its creation than a careful restriction within its literal terms of reference. He believes that what the Air Board wants from the Civil Aerial Transport Committee is not discreet answers to set questions but comprehensive plans and a general review of all possibilities (of which labour troubles are not the least) affecting the peace future of the Empire in the Air.

November 10th, 1917.

H. G. WELLS.

## SIDE-WINDS

THE Sun Electrical Co., Ltd., of 118-120, Charing Cross Road, W.C. 2, have this year sent out a very delightful calendar—a thing of beauty and a joy for, anyway, 1919. And never a word about advertising their own company, except hidden completely away, is printed on the surface. The Sun company, upon application, will gladly forward a copy to any reader of "FLIGHT" who has not already received one, as they have not this year, owing to paper restrictions, been able to send out their usual desk memo. calendar re-fills.

MR. G. H. HUMPHREY, of John Dawson and Co. (Newcastle-on-Tyne), Ltd., and the Fairby Construction Co., Ltd., has joined the board of the Grosvenor Carriage Company, Ltd., of Willesden.

MR. S. E. GEORGE, works manager of Messrs. Naylor Brothers (London), Ltd., the well-known varnish manufacturers of Southall, has been appointed a director of the company.

It should be noted that the Premier Lamp and Engineering Co., Ltd., is the new title of the Cremer Lamp and Engineering Co., of Moorfield Works, Whingate, Leeds, the change being made to emphasise the fact that it is a purely British concern. As many people are aware the word "Cremer"—of enemy alien origin—related to certain patents (applied to mining lamps) which were purchased by the company for development, and in view of the contemplated extensions of the business it has been thought better not to run any risk of misunderstanding amongst new customers.

WHEN the question of arranging the 47-hours week came up for consideration at Messrs. C. A. Vandervell and Co.'s, the well-known electrical engineers of Acton Vale, Mr. George Steel, the works manager, suggested to the staff that they should hold a secret ballot. The shop stewards in conjunction with the management supervised the voting, which resulted in the 7.30 to 5 p.m. scheme being selected by a very great majority. Not a single ballot paper was spoiled.

OUT of a sheaf of recent testimonials to the merits of Triplex wind-screens received by Mr. Reginald Delpech, he sends us the following:—"Lieut. —, R.A.F., on going up for the first time at La Basse in his Sopwith Camel, had a severe encounter with several German machines, and was obliged to come to earth. His machine had sustained no less than 37 bullet holes, but owing to the fact that the wind-screen was of 'Triplex' safety glass, the pilot escaped without a scratch. Two bullets, both fired at very close range, hit the centre of the screen, but they only just pierced it."

OF the many attempts to solve the packing problem, one of the most successful has been the "M-ten" collapsible crates and boxes made by Messrs. Madgwick, Ltd. These are so ingeniously constructed that they can be put together in one minute without nails, screws or hinges. They are perfectly rigid, and stronger and less liable to damage than the old-fashioned nailed-up crates and boxes. When empty they can be collapsed for return as empties. All parts are interchangeable and any damaged portion can be immediately replaced. They effect a saving of 80 per cent. in storage room—a valuable consideration in itself—and, we understand that goods carried in them are taken at railway company's risk. Another advantage claimed for them is that they are pilfer-proof, because each part interlocks with the other and no part can be removed for the purpose of extracting the contents. These crates and boxes have stood the test of two years' usage by large numbers of manufacturers and the demand for them is growing daily. Messrs. Madgwick, Ltd., of 21-22, East Row, N. Kensington, London, W. 10, the sole makers and patentees of the "M-ten" collapsible crates and boxes, offer to send a specimen crate or box on request to all enquirers.

THROUGHOUT the War the whole output of K.L.G. sparking-plugs was reserved for the R.A.F. The manufacturers, the Robinhood Engineering Works, Ltd., of Newlands, Putney Vale, S.W. 15, inform us that they are now able to supply these famous plugs to the public. Motor cyclists' requirements have been specially catered for in type F. 13, which has been produced for engines of high efficiency; it is also light in weight. For cars and motor-boats type F. 7 is most suitable.

## COMPANY MATTERS

### Bleriot Manufacturing Aircraft Co.

THE Official Receiver and Liquidator announces a second and final return to the ordinary shareholders of 5s. 2½d. per £1 share. This, with the first payment of 10s., makes a total return of 15s. 2½d. in the £1.

### The Sunbeam Motor Car Co., Ltd.

SPEAKING at the adjourned fourteenth annual meeting, Mr. T. Cureton (the chairman) said:—

"I think you will all agree with me that there is a great future for the aeroplanes, not only for war purposes, but for various needs when the saving of time is important. We have supplied hundreds of aeroplane engines to the Government, and if other countries buy from us, as I have reason to believe that they will do, it seems to me we shall require a larger capital than £270,000. Further, as the directors have certain extensions in view, you will agree that our present capital is totally insufficient. With these remarks I formally move, 'That the report and balance-sheet be approved and accepted, and that the sum of £50,000 be placed to reserve, bringing this account up to £270,000, and that the balance of £87,167 be carried forward.'"

Mr. W. M. Iliff, joint managing director, in seconding, said that the company had still got a good deal of waste to get through on war contracts. Immediately after the holiday following the armistice, they commenced on peace work. Although they had not been able to do much since, they hoped to get to work very shortly on making cars. Of course, they would be making aeroplane engines as well. From inquiries and indications generally, he had not the least doubt but that they would have a big demand for their cars.

The resolution was carried.

An extraordinary general meeting was then held to confirm the resolutions passed at the meeting on December 20. The meeting was purely a formal one, rendered necessary on legal grounds. He proposed a resolution authorising the directors to convert any undivided profits of the company, available for dividend on its ordinary shares, into capital, by appropriating the same amount to the ordinary shareholders in proportion to amounts paid up on the ordinary shares held by them, in or toward satisfaction of the amounts unpaid in respect of any shares in the capital of the company allotted among the ordinary shareholders.

Mr. C. N. Wright seconded the resolution, which was agreed to.

A further extraordinary meeting was held to sanction the increased capital of the company to £700,000 by the creation of £80,000 additional shares of £1 each.

The chairman, in moving the resolution, said:—"The concluding business of this meeting is rendered necessary in order to carry into effect your decision to capitalise part of the present reserve fund of the company, in order to let such financial resources remain permanently in the business and render it impossible hereafter to distribute any such sum of money as is here concerned. The present scale of your business necessitates the continual employment of a much larger capital than has hereto sufficed. The matter is summarised in the extraordinary resolutions before you. We have been over all the ground before, and you have made your views known on the subject."

Mr. Wright seconded the motion, and the proposition was passed.

## NEW COMPANIES REGISTERED

**CABAL CONSTRUCTION AND SUPPLY CO., LTD.**—Capital £5,000, in £1 shares. Aeronautical and automobile constructors, carriers by aircraft and otherwise, etc. First directors: M. Bowman, N. Lewin and W. Lewis.

**LUBROS ENGINEERING CO., LTD.**, 242, Archway Road, Upper Holloway, N.—Capital £2,600, in 2,500 preference shares of £1 each and 2,000 ordinary shares of 1s. each. Manufacturers of lubricators, bombs, plant machinery, mechanical devices, etc. First directors: Mrs. K. A. Furnivall, L. A. W. Furnivall and F. R. Pool.

**MODEL SUPPLIES, LTD.**—Capital £600, in £1 shares. Acquiring business of a toy aeroplane manufacturer, etc., carried on at 14, Warrender Road, N. 18, by H. R. Weston, as the "Star Manufacturing Co." First directors: J. H. Cornish, P. H. Judge and R. H. Weston.

## PUBLICATIONS RECEIVED

*Army Demobilisation Regulations.* Part I. London: H.M. Stationery Office.

*Army Demobilisation Regulations.* Part II. London: H.M. Stationery Office.

*Army Demobilisation Regulations.* Part III, Labour Units, Q.M.A.A.C., The Volunteer Force. London: H.M. Stationery Office.

*Calendar, 1919.* Jones and Shipman, Ltd., East Park Road, Leicester.

## Aeronautical Patents Published.

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = motor

### APPLIED FOR IN 1917

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published January 23, 1919.

8,786. J. G. ROSE. Level and inclination or angle indicators. (121,611.)

### APPLIED FOR IN 1918

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published January 23, 1919.

1,636. R. H. DAVIS. Dress for airmen. (121,657.)

1,820. J. E. MARSHALL. Level indicators for aeroplanes. (121,661.)

## Index and Title Page for Vol. X.

The 8-page Index for Vol. X of "FLIGHT" (January to December, 1918) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 8d. per copy, post free.

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages lix, lx, lxi and lxii).

## FLIGHT

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